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ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

[OFFICIAL NOTICE.]

Third Annual Convention, Canadian Gas Association.

CANADIAN GAS ASSOCIATION,
OFFICE OF THE TREASURER,
WOODSTOCK, CANADA, April 19, 1910.

The Third Annual Convention of the Canadian Gas Association, and the first gas show ever held in Canada, will be held in Alexandria Rink, Hamilton, Ont., June 6th to 11th, inclusive. The Canadian Gas Association indorses to the fullest measure the exhibition.

Yours truly, A. W. MOORE, Secretary.

BRIEFLY TOLD.

MAY MEETING, NEW YORK SECTION, ILLUMINATING ENGINEERING SOCIETY.—There was a good attendance at the regular monthly meeting of the New York Section of the Illuminating Engineering Society, held in the Engineering Society's Building, the evening of the 12th inst. Mr. V. R. Lansingh occupied the Chair, and he called upon Mr. P. S. Millar to read the first paper, entitled "Illuminating Tests," which Mr. Millar had prepared in conjunction with Dr. C. H. Sharp. It proved to be a most able plea for illumination tests in connection with lighting installations, and carried much data covering methods, etc. The second paper, entitled "A High Efficiency Reflector for Street Lighting," by Dr. C. H. Sharp, was read by the author, who is also the designer of a rather odd-looking, but apparently effective metal reflector for use in connection with electric incandescent lamps, which shows the use of a much larger reflecting surface than is usually found in the dominant types. The third offering consisted of an "Informal Talk and Demonstration of Flame Standards," by Mr. C. O. Bond, of Philadelphia, who stated that the gas industry was partial to flame standards, since they were the only ones which were affected by atmospheric changes in a like degree with the gas under test. The Carcel standard, which was introduced in France in 1798, was also exhibited and described. The candle, which was used in England from 1831 to 1893, was not shown; but its successor, the Pentane standard, was exhibited. The latter had the advantage of being 10-candle power in size, but was quite expensive to operate. The Elliott 5-candle power standard, which was also exhibited, overcame the latter difficulty; but it was more suitable as a secondary standard. The demonstrator further stated that, while the Hefner standard was undoubtedly very accurate, it had not come into general use, mainly owing to its small size. The three subjects were discussed jointly, and most of the attention was directed towards Dr. Sharp's paper on "Reflectors." Mr. Bond suggested that the reflecting surfaces be so arranged that the light could be directed at an angle of 165° instead of 180°, and thus illuminate the further side of the street to better advantage. Mr. Basset Jones seemed to think the glare would be a serious objection, and spoke in favor of opal glass inclosing globes. Mr. Owens stated that in street lighting, where these reflectors would be used in connection with small units, we needed all of the light available; further, that the question of being able to see

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beyond a glaring light was largely affected by the nearness of the next lamp. Mr. Lansingh quoted some figures, covering the reduced sensibility of the eye when a high candle powered lamp was in the field of vision, the range being from 30 per cent. to 86 per cent. Others who participated in the discussion were Mr. Macbeth, of Philadelphia; Dr. Ives, of Cleveland; Prof. Sherrer, of Cornell; and Mr. J. Eck, of London, England. At the June meeting two papers are promised: One by Dr. Rosa, on "Photometric Standards," the other, on "The Incandescent Lamp as a Standard for Candle Power," by Messrs. Sharp and Millar. The following nominations for Section officers during the ensuing year have been made and will be voted upon at the June meeting:

Chairman.—Dr. A. H. Elliott.
Secretary.—Mr. A. J. Marshall.
Managers.—Messrs. S. G. Rhodes and L. R. Hopton.

MEETING OF THE EMPIRE STATE GAS AND ELECTRIC ASSOCIATION.—The last meeting of the Empire State Gas and Electric Assoctation was held in the Assembly Room of the Yates Hotel, Syracuse, N. Y., the second Wednesday of May. There was an attendance of not less than 50, and as the morning was to be devoted to the discussion of gas questions, several of the electrical representatives took the opportunity to visit the plant of the Syracuse Lighting Company, under the direct guidance of a number of the Company's representatives. When the meeting was called to order by Vice-President M. J. Brayton, Mr. De Long extended a hearty invitation to all of the delegates to be his guests at luncheon in the pleasant domicile of the Country Club. After this had been disposed of—and the affair was in every sense and respect an enjoyable one—the delegates returned to the hotel, and during the afternoon several matters of general interest to both gas and electric men were discussed formally. No set papers were read, and the sessions were free to anyone to bring up such matters as were of common concern. The pleasing and beneficial result was that many developments were discussed, the final outcome of which will be of considerable avail and assistance to those who shared in the debates. It has been determined to continue meetings of this nature from time to time, it being certainly defined that great benefit is felt from such snappy cross-examinations. About the only formal business transacted was (right before adjournment) the hearty adoption of a vote of thanks to the Syracuse Company for its genuine and gracious hospitalities. In fact, the count was taken by standing vote. Secretary Charles H. B. Chapin, of course, was at his desk, brisk, bright, attentive and genial.

COMMITTEE OF ARRANGEMENTS, AMERICAN GAS INSTITUTE MEETING.—A well-attended meeting of the Committee of Arrangements, in charge of the preliminaries and finish of the next meeting of the American Gas Institute, was held in the Institute's headquarters, New York city, some days ago, with the Chairman (Mr. W. R. Addicks) directing. Mr. A H. Hall was appointed Secretary and Treasurer. The following Committees were appointed:

Plan and Scope.—Messrs. W. B. Addicks (Chairman), A. C. Humphreys, T. N. McCarter, A. E. Forstall, George E. Woods, W. J. Clark and W. Cullen Morris.

Headquarters, Hotel Accommodations, Etc.—Messrs. A. E. Forstall (Chairman), H. L. Doherty, W.W. Randolph and W. C. Morris.

Banquet and Reception.—Messrs. T. N. McCarter (Chairman), A. C. Humphreys, J. H. Jourdan, L. B. Gawtry, W. G. Hoyt, C. M. Higgins, George G. Ramsdell, R. A. Carter and A. H. Hall.

Entertainment and Excursion Committee.—Messrs. W. J. Clark (Chairman), R. W. Rush, George E. Woods, E. H. Rosenquest, Carlton Macy, J. J. Humphreys, T. O. Horton, C. G. M. Thomas, A. S. Fox and Thos. E. Byrne.

The plans of reception and entertainment were tentatively but searchingly discussed. While it is rather stretching a point at this time to say that anything was definitely decided upon, save in respect that there would be a theater party the evening of the 19th (Wednesday), a banquet the evening of the 20th, and an excursion on the 25th, the details were referred to the various Committees, these to report to the Committee on Plan and Scope the evening of Wednesday next.

CURRENT MENTION—

MR. E. L. BRUNDRETT, General Auditor, United Gas Improvement Company, since 1898, has been appointed Kansas City Agent for Messrs. McGowan, Small and Morgan, Natural Gas Trustees for that city succeeding the late Mr. James B. McGowan. This will be something in the nature of a return to his original field of action for Mr. Brundrett, who 25 years ago was an associate of the late Mr. George B. Clarke, and with him at one time eventually controlled or dominated the policy of the old Kansas City Gas Light and Coke Company.

MR. J. EDWARD HATCH, since 1905 Manager of the Rochester (N. H.) Gas Light Company, left that service Saturday last, to take up the duties of Manager of the Greenfield (Mass.) Gas Light Company.

THE District Judge (Hon. William C. Van Fleet) has rendered a decision making permanent the injunction sought out by the Pacific Gas and Electric Company, to restrain the authorities of Petaluma, Cal., from enforcing an ordinance establishing the gas rate at $1.17 per 1,000 cubic feet. The Company alleged that the rate was too low to allow it to operate at all, to say nothing of earning a profit over the business done, and the Judge allowed the justness of the demurrer.

THE County Commissioners of Laredo, Tex., have granted to the Border Gas Company the right-of-way to construct a pipe line along and under the public roads of the county for the transporting of gas to Laredo from Reiser.

MR. J. J. BROOKS, JR., General Sales' Manager of the Harbison-Walker Refractories Company, has been elected a member of the Company's Directorate.

MR. A. V. WAINRIGHT, Secretary of the United Service Company, of New York, has resigned from that service, having accepted a responsible position on the new business staff of the United Gas Improvement Company. It is thought (also hoped) that his successor will be Mr. H. L. Sterrett.

THE May meeting of the Chicago Section of the Illuminating Engineering Society was an exceptionally interesting one. It was held the evening of the 19th inst., and the chief factor in respect of the session was a visit to the Federal Building, Chicago, where a full and free inspection of the various lighting schemes, together with a review of the installation details and the maintenance items consonant therewith, were much enjoyed. This was all permissible and obtained by direct invitation of the Custodian and the Chief Electrical Engineer of the huge, though somewhat complex, edifice.

RUMOR keeps industriously repeating the suggestion that the city of Nashville, Tenn., is more than ever disposed towards operating the local gas plant on municipal account. And it is positively said that the McTigue-McBride measure now before the Council, with the purpose of enabling the city to take over the named plant for operation on public account, is really meant to accomplish such object. However, others declare that some ulterior purpose is beneath the bill, possibly to assist in clouding the objects of certain "syndicators," who have long looked with wistful eyes upon the possibilities that lie in the city of Memphis. Cut out that provision in the franchise which makes it possible for the city to purchase the plant within certain specified periods, then the citizens may rest assured that the present management will not long remain in control.

"PALATKA," writing from St. Augustine, Fla., under date of the 16th inst., says: "The Hoyt dynasty is surely keeping faith with the residents of Jacksonville, Fla., in respect of its promise to reduce the gas selling rate at and on every opportunity possible. When the present owners succeeded to the property a run-down plant, inadequate service (the latter had to be from the very nature of things) and high rates ruled. Now it is altogether different, for when the owners put Manager Hoyt in charge he was promised loose reins and active support. These have been availed of wisely and well, with the net result that the works are in excellent condition, order reigns where chaos ruled, the service is quite up to that of any other city of corresponding size in America, and all this is going on at a selling rate, fully 35 per cent. cheaper than it was when this new era was registered. To crown it all the residents are in good accord with the Company; I say the future of the Company is to its past as plus is to minus.

"V. R. D.," writing from Baltimore, Md., says that, beginning the 1st prox., the City Hall, No. 1, on Gay street, and No. 2 (the old Central Police Station on North street), will be lighted by the Consolidated Gas, Electric Light and Power Company, at the rate of 3 cents per kilowatt hour, according to a contract (to run for 1 year) accepted by the Board of Awards the morning of the 12th inst.

THE Company chartered 2 years ago to construct and operate a gas works in the City of Mexico, will be ready to distribute gas on commercial account by the 1st prox. The generating apparatus has been tested up, and the distributing system was being tested during the week ended the 15th inst.

THE Special Council Committee, Cleveland, O., City Councils, appointed to commence negotiation for an artificial gas contract with the East Ohio Gas Company, has been authorized to hire a gas expert, at an expenditure not to exceed $2,000.

AT the annual meeting of the Northern Westchester Lighting Company the Directors chosen were: F. A. Stratton, Geo. B. Cortelyou W. R. Addicks, John W. Sterling, Wm. Rockefeller, F. A. Vanderlip, H. E. Gawtry, T. E. Murray and L. B. Gawtry.

MR. G K. DUSTIN has been appointed Manager of the Altoona (Pa.) Gas Company, vice Mr. W. B. Perkins.

The Reconstruction of the Concrete Tank in Connection with the 150,000 Cubic Foot Gasholder, the Property of "The Light, Heat and Power Department," City of Kingston, Ontario.

[Prepared for the JOURNAL, by Mr. C. C. FOLGER.]

The original specifications, as furnished to the contractor, called for a concrete tank 68 feet diameter by 24 feet deep, by approximately 2 feet thick, to be composed of the following components: Cement, 1; sand, 3; stone, 6; and, in addition to this, large stones were allowed to be placed in the above mixture as long as they were kept a distance of 5 inches from the inside face of the wall. The hole for the concrete tank was quarried out of a limestone foundation, and the wall when completed was not to be more than 4 feet above the ground. This was thought advisable on account of the saving effected as regards heating, depreciation, etc.

The contract for the entire masonry was placed with a local contractor, and upon completion the tank was found defective in two ways. First, on account of the enormous leakage; second, on account of the irregularity of the circle. That is, it was impossible for the holder to work properly upon the lower T-rails on account of the great variation in the walls of the tank; the rollers would bind at different sections. This latter defect was remedied somewhat by cutting away the wall and substituting smaller wheels; but the matter of leakage was a serious problem. Various means were employed to stop the leaks; all kinds of loose material, such as bran, sawdust, etc., were dumped into the holder, but this process failed to check the waste. The leakage at this time varied from 4 inches to 20 inches in 24 hours. The whole interior of the tank then received a coating of pitch and resin applied as hot as possible; but this also proved a failure.

The contract was then placed with an American waterproofing concern, who proposed lining the entire interior, including the bottom, with tarred paper and asphalt. This paper was held against the main concrete by a brick wall which would completely encircle the tank, while the bottom was to be covered with about 4 inches of fine concrete placed over the paper after same had received a good coating of the liquid. This latter suggestion was carried out, but the building of the brick wall was held up owing to considerable opposition regarding permeability or making it a lasting and satisfactory job. It was finally decided to call in expert advice, and in view of this Capt. Wm. E. McKay, Engineer of the Boston Consolidated Gas Company, was engaged to submit a detailed report on the existing conditions and the most advisable plan to adopt as regards a permanent job. The condensed finding of this report was to either remove the present defective walls, or contract with a responsible waterproofing firm to align the face of the tank wall, vertically and horizontally, and to apply an efficient cement waterproofing to the side wall and bottom.

This advice was acted upon, and in the spring of 1909 it was decided to call for tenders for the complete reconstruction of the entire structure; that is, the entire concrete work was to be gone over so as to conform with the original specifications, as laid down by the Davis & Farnum Mfg. Company, of Waltham, Mass., who received the contract to place the steel structure in commission. These were drawn up and the contract was awarded to Messrs. Merrill & Allen, Contracting Engineers, Toronto, Ont., who carried the undertaking through to a successful finding, the leakage being checked and the ironwork placed in position in accordance with the original design.

The following synopsis is a copy of the report submitted by the writer to Council, which explains the system adopted and the results accomplished:

KINGSTON, ONT., Nov. 11th, 1909.

R. F. ELLIOTT, Esq., Chairman, and Members of the Light, Heat and Power Committee—Gentlemen: In accordance with your instructions, under date of Nov. 2nd, 1909, *re* repairs to gasholder tank, beg leave to submit the following report:

On the 12th of July the main valves of the new holder were closed, and Messrs. Merrill & Allen, the contracting parties, commenced work. The first step was to inflate the steel tank with air, in order to allow the grabhooks to be placed in proper position under the outer shell. These hooks being properly installed, the work of raising the outer section was undertaken and carried out successfully, the shell being raised several feet above the top of the main concrete wall. The inner lift was then blown up to the water line and another allotment of hooks placed in position. By means of large chain blocks both these sections were raised so as not to interfere with the propos ed work on the defective concrete structure.

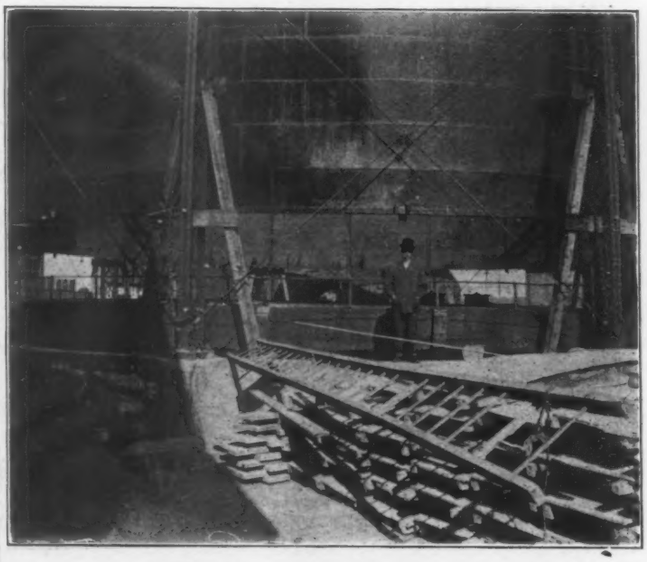


Fig. 1.—Outer lift suspended above main concrete wall, showing lattice columns reinforced, with chains and tackle erected, getting ready to inflate inner shell with air.

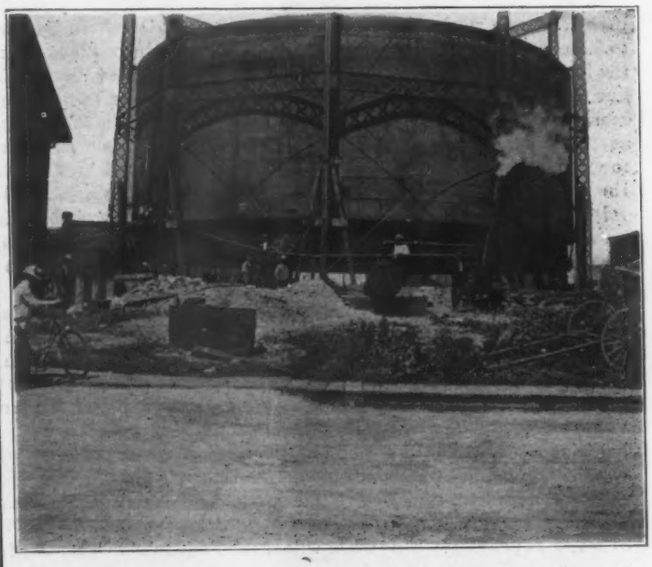


Fig. 2.—Both lifts suspended above main wall, ready for cleaning out and relining.

Fig. 3.—Showing the manner in which the inside face of the wall was cut away. Two air chisels at work removing the concrete. This print shows the poor construction of the wall proper as regards the composition of and workmanship on the concrete.

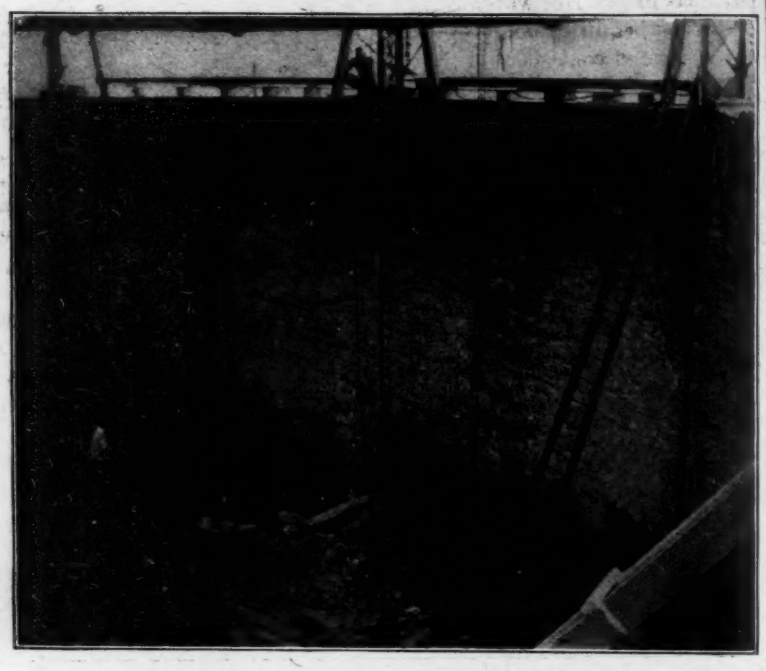


Fig. 4.—Replacing the T-rails upon the inner face of the tank after the defectiv lining had been removed by the compressor. These rails were all set plumb befor the work of relining commenced.

The concrete work consisted first, in the removal of from 3 inches to 8 inches depth from the interior lining of the walls of the tank and the lowering of the base of the tank to its proper elevation. This having been done, by means of hand labor and pneumatic hammers operated by an air compressor, the debris was lifted clear of the tank and deposited on the ground around it, being afterwards carted away to waste dumps. A drain was then dug all around the inside edge of the tank to take care of leakage from the outside. This drain had a fall to a sump hole where proper pipe connections were made for pumping by means of a steam pump on the surface of the ground clear of the tank, and discharging into a manhole connected with a drain. This pump was operated continuously until the completion of the concrete work. On the completion of this drain an entirely new bottom, of from 4 inches to 5 inches in thickness, of a rich mixture of concrete was spread over the whole base, being well rammed and worked into place. As soon as the bottom became sufficiently dry to walk upon, the work of placing the lining on the walls of the tank was proceeded with. The forms for this were of a special design, being about 30 inches high, and a complete circle of the same was coupled up, behind which was placed the mixture of concrete. The concrete, as before, was very rich in mortar and contained a percentage of hydrated lime, being designed to be as impervious to the action of water as possible. This work was carried out in a very successful manner, and in most places on removing the forms a good, clean, close-grained surface was shown. The bond between the interior lining and that part of the old wall left in place seems to be first-class, every precaution being taken as this part of the work progressed. A section of the wall near the surface was removed to test this bond and the joint appeared practically sealed. The lower T-rails and landing piers were entirely removed during the course of construction, the same being replaced at proper intervals and in line with the upper guide rails, so that the joint at the base of the guide column was decidedly improved upon.

Upon the completion of the concrete work the tank was made as dry as possible and allowed to stand for a few days before being filled with water. About October 6th the tank was filled up and the work of lowering the suspended shells carried out successfully. The air-blast was again turned on and the steel holder raised so that the grab-hooks might be released. Everything appeared to be going along smoothly until the wheels which work in the guide supports reached the first cross-section of the lattice girder, when the whole tank began to bind and a couple of rollers jammed against the T-rails. The holder was then lowered a little, and adjustments being made at the necessary columns, the second time the tank was elevated clean to the top. At this juncture some of the rollers appeared to be somewhat tight, but we figure that, after the holder had been brought into play a little, these defects will straighten themselves out satisfactorily and the tank as a whole strike its proper bearing.

On Tuesday, October 12, gas was admitted and the new holder placed in regular commission. The first test for leakage was made Friday, October 15, from 9 A.M. of that day until 9 A.M. of Saturday, October 16, which showed the water dropped ¼ inch, or 236 gallons, in 24 hours, or less than 10 gallons per hour, which is considerably inside the guarantee, the contractor being allowed a margin of 15 gallons per hour. Since then it has not been necessary to add any additional water in order to maintain the seal. The ironwork as a whole stood the strain placed upon it in good shape, and at the present time, to all appearance has worked very efficiently.

Up to time of writing there has been only one complaint in the neighborhood as regards a leakage of gas and water, which in all probability can be remedied at a moderate expense. The coming winter will afford a good opportunity of testing the general efficiency of the tank as a whole.

In the opinion of the writer all work in connection with the reconstruction of the tank has been performed to the best of the ability of Messrs. Merrill & Allen, and they are to be commended for their efforts in so far having carried out to a successful issue their contract with the city.

British Plans for Gas Publicity.

[Prepared for the JOURNAL by MR. GLENN MARSTON.]

While the electrical industry in Great Britain is not as progressive as in America, the same may not be said of the gas business. British gas and electric companies are not governed by any community of interest such as prevails in American cities, and, therefore, competition is both keen and aggressive, particularly on the part of the gas companies.

The need of adequate publicity has been felt more sharply by the gas companies than by the electric stations; and to carefully prepared and generously distributed publicity the gas companies are indebted for holding the upper hand in the controversy at the present time. The best examples of gas publicity are the productions of the Gas Light and Coke Company, of London. Many of the ideas embodied in that Company's literature can be used advantageously in America, although, of course, much of their argument applies to British conditions, with no parallel in this country.

One of the best of the Gas Light and Coke Company's publications is a booklet entitled "Domestic Problems and Their Solution." A part of this booklet is devoted to the usefulness of gas in abating the "pea soup" fog of London. The balance concerns the servant problem. A preparatory note says: "To those who, on taking up this pamphlet, may ask, 'What are these problems, and am I sufficiently interested in their possible solution to read several pages of printed matter?' We reply: Have you—and your furniture, blinds, carpets, curtains, silver—ever suffered from the filth of a London fog? Have you ever experienced all the worries, troubles and inconveniences implied by the phrase: 'The Domestic Servant Difficulty?' If so, you are interested in the pages which follow; and what Londoner can answer 'No' to the first question; and how many 'No' to the second?"

While American cities do not suffer from such fogs as are the curse of London's climate, the arguments in this booklet are worth considering in connection with the smoke nuisance, which is no less severe in America than in England. The booklet says, "London is not, in the broad sense of the word, a manufacturing city, but rather the greatest market and trading city in the world; and the smoky nature of the atmosphere is not mainly due to its factory chimneys—though, unfortunately, those factories which continue to use steam instead of gas engines contribute their full share of grime to the air.

"It is the myriad chimneys of the private houses of London that do more than all else to fill the atmosphere with soot and sulphur; and it is the ranges and grates that make half the dust, dirt and labor in every household where coal fuel is used."

A few of the usual questions asked by prospective consumers are then asked and answered, such as, "Can I afford it?" "In what other ways shall I benefit?" "Are gas fires healthy?" "What about hot water supply?" These questions, properly answered, naturally lead to a study of the servant problem in its relation to gas service, and the clever Britisher shows, by actual testimonials, that gas has done away with coal, and has also saved the cost of one maid, the gas bills being lower than either one of these items.

One of the most interesting of these testimonials says, "I would not be without my gas fires for anything. They cost me nothing, because on the day they were fixed I gave one of my maids notice, and my year's gas bill does not exceed the cost of that maid, while I save my coal bill as well." Another one calls attention to the difference in laundry and cleaning bills where gas is used instead of coal.

From this the booklet comes down to the ordinary consumer who has one servant, or none. Gas in the one-servant home will, says the Englishman, "(1) Not cost more than coal. (2) Greatly reduce the servant's work: and, therefore (3). Make it much easier to keep a good servant, and far less irksome to do the housework when a servant cannot be got. (4) Reduce the cleaning and renewal expenses on curtains, carpets and furniture, and (5) Diminish very materially the smoke nuisance."

A great deal of attention is devoted to the question of the healthfulness of gas. The unwarranted criticism of gas and its effect on the atmosphere of rooms has been even greater in England than in America. Therefore, the Gas Light and Coke Company pay particular attention to dispelling the illusion that gas is unhealthy. In the booklet, on domestic problems, two pages are devoted to this subject, mostly being clippings from the papers reporting addresses by well-known medical authorities. Several leaflets and booklets are devoted wholly to this subject, while the Company has widely circulated an exhaustive treatise of 132 pages entitled, "The Relative Hygienic Values of Gas and Electric Lighting." The author, Dr. S. Rideel, prepared the paper for the Royal Sanitary Institute, and finds that gas is in no way inferior to electric light, but is superior in that it sets up a circulation of the air entirely lacking in rooms lighted electrically.

A booklet of 20 pages bears on its cover a reproduction of an old

Fig. 1.—"The Light of Other Days."

woodcut entitled "The Light of Other Days." The booklet itself is called "The Light of To-day and of the Future;" being an account of actual experiences respecting the relative cost of gas and electricity, related by some of the 3,000 consumers who have substituted incandescent gas for electric light. Testimonials are given from all grades of consumers, headed by the South Coast Railway, which saves $5,500 a year over the cost of the former electrical installation. Many comparative bills are reproduced.

Another pamphlet shows the uses and advantages of a quick supply of hot water. The inside of the pamphlet goes more into detail regarding the superiority of gas water heaters over the heating of water by coal fires. Hot water supply is given added importance in one of the most beautiful booklets ever published by a lighting company. This booklet consists of 16 pages and cover, is printed on heavy enameled paper, and is profusely illustrated by the 4-color process. One illustration shows a man shaving in the morning; another shows the maids using water heaters; another shows a sick room with a small boy in bed and the doctor calling for an immediate hot bath (for the boy), which, of course, is forthcoming on account of the gas water heater. The pleasures of a warm bath after summer tennis or golf are suggested in a brilliantly sunlit porch, while smaller illustrations show the different types of heaters themselves. Two pages of this booklet are reproduced, as they present a clear and concise argument in relation to heating water by gas and coal.

A large amount of publicity work is also done along industrial lines. One pamphlet deals with gas engine driven refrigeration plant and is addressed, on its title page, to "butchers, dairymen, fishmongers, hotel keepers, pork butchers and sausage manufacturers, provision dealers, restaurant keepers and all others requiring cheap cold storage." This pamphlet contains a proposal by the Gas Company to act as agent for the purchase of refrigerating plants and gas engines from their respective makers, payment to be made in seven quarterly installments, thus giving the purchaser almost two years in which to pay for his equipment. Of course, proper attention is given to setting forth the cleanliness, dryness and easy regulation of artificial cold storage plants, and the names of the approved manufacturers—those with whom the Company has arranged—are printed so that a prospective purchaser may make his inquiries direct if he chooses.

A whole page of this pamphlet is given to the following statement: "If you are a user of electricity your attention is particularly drawn to the fact that a dynamo to generate your requirements of current can be driven by the same gas engine as runs your refrigerating plant, if one of sufficient capacity be installed; and that, by such

THE GAS LIGHT AND COKE COMPANY.

Some Practical Suggestions
as to how to obtain—with Economy—the comfort of a
Constant Hot Water Supply
without the use of Coal.

The Vital Importance of an Ever-Ready Supply of Hot Water.

The comfort and convenience derived from a constant (or instantly obtainable) supply of hot water in the home are so universally recognized as to need no argument. Hot water is, indeed, a daily—an hourly—necessity in almost every household, and may at any moment, through sudden illness, chill, or wetting, be of literally vital importance.

How it may be obtained.

The question then is, not whether an assured supply of hot water is desirable, but how it is most satisfactorily to be obtained under varying conditions, and to meet the varying requirements of flats, villas, large houses, mansions and public institutions; and it is a question which has become one of pressing importance of late years through the almost universal adoption of gas stoves for cooking.

The Old-Fashioned Method.

The provision for hot water supply commonly made by the architect and builder is a boiler at the back of the kitchen range heated by the kitchen fire. With some ranges the supply of hot water obtained is excellent both in quantity and temperature; with others a supply of only tepid water is obtainable in the bathroom after an enormous quantity of coal has been burned.

Drawbacks to the Coal Range.

Whether, however, the coal range boiler is efficient or inefficient, there are always two very serious drawbacks to any system of hot water supply that is based upon a coal-fired range.

No Hot Water during the Night.

The first of these drawbacks is that (unless the storage tank is most carefully insulated so as to prevent the rapid loss of heat by radiation that otherwise takes place, and unless, in addition, the coal fire is kept going until the last thing at night, and is then banked up) no hot water is obtainable at short notice during the night in case of emergency, and no hot baths can be obtained in the morning until a considerable time after the servant has lighted the kitchen fire. As the modern servant has not, usually, a *penchant* for early rising, the morning hot bath that depends upon

CHIEF OFFICE: HORSEFERRY ROAD, WESTMINSTER, S. W.

Fig. 2.

THE GAS LIGHT AND COKE COMPANY.

No Hot Baths in the morning.

her good offices is frequently conspicuous by its absence.

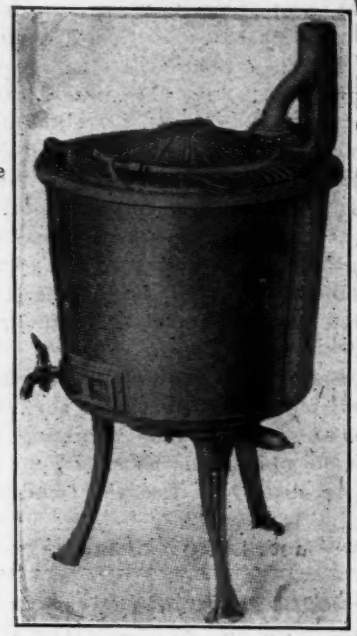
Discomfort in hot weather.

The second (and a very serious) drawback to hot water circulation that depends upon the kitchen coal fire is that in hot weather the alternatives have to be faced—whether to do without hot baths and hot water supply generally, or to burn a large quantity of coal for no other purpose than obtaining hot water, and with the result of making the kitchen insufferably hot and the house generally uncomfortably warm.

Solutions of the Problem.

The Geyser.

Many householders and flat-dwellers have dealt with this difficulty by installing a geyser in the bath-room, and depending on the gas cooker for the supply of hot water for washing-up and other domestic purposes, supplementing it by a gas heated "Wash-house Boiler" in the scullery, taking the place of the old-fashioned and highly inconvenient "copper."



A Wash-house Boiler.

	10 gal.	14 gal.
Cash price	£2 10 0	£2 15 0
High pressure for 3 years	4/6 per qr.	5/- per qr.
Hire only	1/9 "	2/- "

This is a very good and convenient arrangement within its limitations, always provided that the geyser is fixed by skilled men and is properly ventilated. The Company make it a rule to employ the makers for the fixing of any geyser they supply so as to insure perfectly satisfactory ventilating arrangements being made. For prices and other particulars relating to geysers, please see p. 4.

CHIEF OFFICE: HORSEFERRY ROAD, WESTMINSTER, S. W.

Fig. 3.

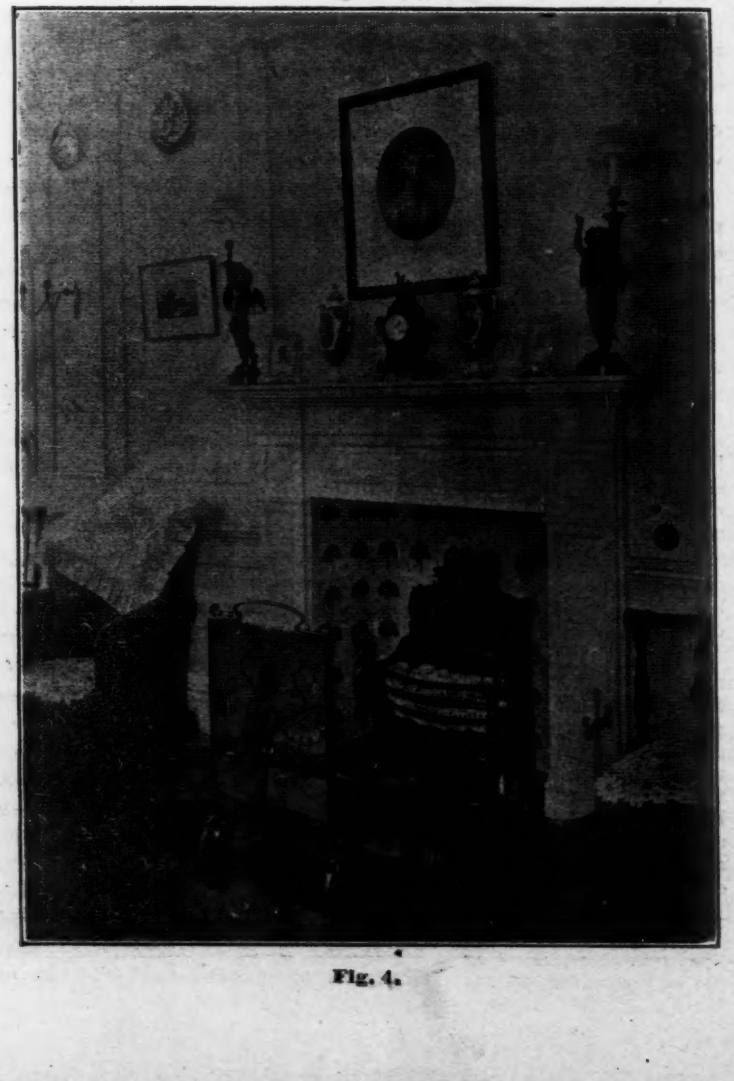


Fig. 4.

means, electricity can be—and is being—generated at a cost of only 2d. [4 cents] per unit, at which price, however, it is considerably dearer than gas."

In addition to the above literature, the Company has a veritable flock of leaflets and circulars on reading meters, how to manage gas stoves, cookers, etc., advantages of the "hire-purchase" system, and many other topics of interest to the prospective consumer, both domestic and industrial. The Company has upwards of 50 such circulars, calculated not only to interest new customers, but to show why old ones should be satisfied with the service they get.

The art of newspaper publicity as practiced in America is unknown in England. There is no effort to secure the publication of reading matter of interest to the Company except on a cash basis, and it must be said that British news columns are much more easily purchased than are those of America, though the cash outlay is larger. The public utilities, instead of being recognized as news sources, on an equal footing with other interests of the community, are considered much better material for the business office than the news room, and are treated accordingly. I do not mean that this is the universal custom, but it holds in the majority of cases where the utilities are operated by private companies. Municipal plants usually receive their share of public attention, though it is seldom that a municipal manager dares break into print for fear of offending some councilman.

[OFFICIAL REPORT—CONTINUED FROM PAGE 951.]

SIXTH ANNUAL MEETING, ILLINOIS GAS ASSOCIATION.

HELD IN THE LA SALLE HOTEL, CHICAGO, MARCH 15 AND 16, 1910.

FIRST DAY—AFTERNOON SESSION.

The President introduced Mr. S. E. Wolff, who read a paper on

RATES FOR INDUSTRIAL PURPOSES.

[For the text of the Wolff paper, see JOURNAL, *ante*, April 25, p. 807.]

Having concluded the set paper, Mr. Wolff added: I would like to add, Mr. President, and it should appear in the paper, that in endeavoring to name rates for industrial purposes or large quantities, by these figures I endeavored to show the cost of serving the average customer under average conditions. [Applause.]

Discussion.

The President—I believe there are a good many members present who could discuss this paper. Is Mr. McPhail present?

Mr. N. D. McPhail—The gas sold by any gas company can be divided into three classes, these three consisting of: Sales made for lighting, domestic fuel and industrial purposes. A rate has been set sufficiently low for us to secure the lighting and domestic fuel business, but in order to increase the sales of our gas much more we find it necessary now to make a rate that will allow our gas to be used for industrial purposes. In order to do this we must take into consideration the fact that we have to enter into competition with coal, gasoline and petroleum; and, with gas at the regular rate, we find we are unable to secure such business in competition with the above fuels, especially where a continuous heat is required. In order to be able to do this several rates have been devised, the chief ones in use being the sliding scale and the maximum demand or readiness-to-serve rate. These rates should be based on the actual cost to the company of the gas furnished the consumer. For example, we have two customers, each using gas to the amount of 300,000 cubic feet per month. One consumes gas during 30 hours per month; the other consumes gas 300 hours per month. In the first case the consumption is 10,000 cubic feet per hour, in the latter the consumption is 1,000 cubic feet per hour, and from this it is obvious that the former would require on our part a much larger investment in plant capacity, main and meter capacity. On that account, then, the former would not be entitled to as low a rate as the consumer who kept our plant in use 300 hours, and he, in turn, would not be entitled to as low a rate as the consumer who kept our plant in continuous use. The ideal customer is he who keeps our investment in use the greatest number of hours. Of course, the larger the consumer the better, but a small consumer burning gas 10 hours per day is much more profitable to a company than a larger consumer burning gas but 1 hour per day. Our aim, therefore, should be to get a rate which would be equitable to the consumers when the rate of one consumer is compared to the rate given to others. You can readily see that the sliding scale rate, regardless of the time that the gas is burned or the number of hours

during which it is consumed, might be fair to the company and yet be unfair to the customer. In looking over the rate recommended in the paper just read, we find in the contract these rates are named only to customers who execute a written contract. In contracts at industrial rates customers agree not to use rates for industrial purposes during peak load hours, except with the written consent of the company, which consent it may withdraw upon short notice. This, to me, is a very weak point in this rate. As a commercial man, in looking to the increasing of the sales of my company, I would dislike very much to go to a customer and tell him he would have to stop burning gas. What we want is a rate that will take care of the peak load, allow the customer to burn all the gas that he needs, whenever he needs it, and have him pay us sufficiently so that we will receive a fair price for the service rendered him. No rate has been devised up to the present time that will do this any better than the readiness-to-serve rate. In one city where this rate is being used 50 per cent. of the gas is sold on the readiness-to-serve basis, and at the present time the daily output of gas used for industrial purposes is over 4 times that which it was 4 years ago, when this rate was put into effect. This company has also kept an account of the customers who, during the 12 months' period previous, purchased gas under the $1 rate, and by comparing the following 12 months' consumption under the readiness-to-serve rate, they find these customers have increased their consumption over 50 per cent. The readiness-to-serve rate may be somewhat difficult to explain to a customer. The rate has been used very extensively in some cities and no complaint has been made by the customer, that he likes the rate but would like it better if he could understand of what it is composed. As soon as he finds out that he can buy his gas for 80 cents per 1,000 where he has been paying $1, the way by which you arrive at the rate is not the point that interests him particularly. The potent fact is the saving of 25 per cent. The readiness-to-serve rate is correct in principle, but what the gas fraternity must do is to have it figured correctly in detail, so that the rate will apply to all classes of customers, take care of all classes of business, allow the customer to use any amount of gas he wishes at any time, and make any demand upon the company, but have the rate so arranged that he pays us for the demand. Then sell him the gas at a rate allowing us a fair profit. When we are able to do that we shall be able to secure much industrial business that, at the present time, cannot be secured by us.

The President—Mr. Rice, you should be able to tell us something about gas rates.

Mr. Rice—Mr. President, you are certainly right in stating that this is a very difficult subject to discuss, and it is certainly a very interesting subject; but the more one thinks about it, the more involved it seems. There is no question that a great improvement could be made in the methods of charging for gas, and that we are behind the electric companies in this respect. There is no question but that, in formulating any rate, the underlying principle of that rate should be to make it absolutely fair to all classes of consumers equally and to the company. In fact it would seem that the power must rest with the legislature, commission or other law making body, to insist that, irrespective of any rates that may be in force, modifications be made to such an extent as will give all customers justice and equality, putting all on the same basis as referred to the service rendered and the cost of that service. The only exception I can see to that possibility of the future in legislation is the question of competition with other fuels. Thus we know that in the railroad business the only exception to the present rule of equal rates for equal service is in the case of common points or cities having competitive service. Thus a railroad can make a lower rate on a long haul than a short haul only where it reaches on the long haul a competitive point, and is forced to meet the competition of lower rates by other roads. While the cases may not be entirely parallel, it is possible, of course, that future legislation may permit a lower price for gas for competitive purposes in relation to the cost of service than for those general purposes for which it is used at present; but, aside from this possibility, and I merely suggest it as something worthy of future consideration, it is certainly true that the proper rate is one hat will give exact equality on the basis of service rendered and the cost of that service to all classes of customers, and, therefore, I take issue with the writer of this paper, in connection with the question of maximum demand rates, to the extent that I do not believe in dismissing these rates simply because it is somewhat difficult to explain them to the customer. This difficulty exists, but can be remedied and modified to a certain extent. In this connection there are good modifications of the maximum demand principle which are very simple; for example, the electric rate here in Chicago, whereby the customer pays a certain rate for his first use of current, amounting to a certain number of hours' use of his estimated demand, and ½ that rate for all current used over that amount. This is a modification of the demand principle which has given great satisfaction here in this city for residence service. In considering this general question I have found it somewhat helpful to take concrete examples. Suppose we imagine two drygoods stores, close together, one a large department store if you like, the other a comparatively small firm, struggling for business. Let us consider that the small concern has a building that is dark, and that it is necessary to light it at all hours of the day, using say 20,000 cubic feet of gas a month, and that the large department store has a well arranged and naturally lighted building, and using no artificial light at all in the day time, but nevertheless consumes say 200,000 cubic feet a month, during perhaps 3 hours of the day, and that spread mainly over a somewhat short portion of the year. If one gets a situation like that pretty clearly in mind it is not hard to see that the smaller store should have the lower rate. As in the relative analysis of costs the only cost per 1,000 that would be greater in case of the smaller concern would be the cost of keeping the account on the books, which is a trivial portion in either case of the total cost. The customer for the 200,000 feet makes a tremendous demand for only a few hours a day. The 20,000-foot customer makes a very small demand, and spreads it over many hours a day. We have in Aurora a maximum demand rate for electric service which we consider very fine and satisfactory. It is somewhat peculiar and I will, therefore, take time in explaining it to you. We first make a demand charge of $1 per horse power, in case of power service, and of 20 cents per 100 watts, connected load, in case of lighting business. This the customer must pay monthly in all cases. In addition we make a consumption charge of 4 cents per kw.; then the consumption charge is discounted according to the ratio it bears to the demand charge. Thus if the consumption charge is only equal to the demand charge there is no discount. If, however, it is double the demand charge the customer gets ¼-cent discount per kw. consumed; if it is 4 times the demand charge he gets 1-cent discount; if 8 times, he obtains a 1¼-cent discount. You will see at once that on this basis the lowest rate goes to the long hour consumer, not necessarily to the man who brings in the biggest bill at the end of the month. The customer who will use his maximum demand 7 and 8 hours a day, 25 days a month, will find that his consumption charge at 4 cents per kw. is 8 times his demand charge; thus he will obtain the full discount and his total charge will run about 3 cents per kw. On the other hand, if he uses his maximum demand only an hour or so a day, he will find that he is paying from 16 to 20 cents per kw., or higher in fact than the regular flat kw. rate in the city in question. There is no distinction between power and lighting business on this rate, and this you can readily see is only proper, because where a customer pays for a certain demand of current, he has the right to use that current for any purpose he may desire and cannot be penalized if he chooses to use it for lighting instead of power. The basis of the demand charge is this. It is estimated that the average cost of a horse power of electricity installed is about $125; 10 per cent. interest and depreciation on that amount is $12.50 or $1 per month. In other words the customer pays us $1 a month, and has reserved for him 1-horse power of capacity, which he can use to any extent he may desire, and for which, as used, he is charged a low consumption rate subject to the discount provided. Now it appears to me the weak point in the rate suggested by Mr. Wolff is that it is worked out for a particular condition and a particular city at a particular time, and that it will not apply to any other city, nor will it necessarily apply to the same city after a year or so has elapsed. I do not dispute for a moment that this is a demand charge for the time being for this particular place, wherever it may be, because they have determined the existing conditions from their books, but I question the flexibility of it, and rather doubt that it will remain a true demand charge after it has been used for a certain length of time and business has developed under it. I can easily see that injustice might come to certain classes of customers under it, and I can also see that such a rate might easily embarrass the Company, for instance, by the establishment on the outskirts of the town of some heavy peak load customers using large amounts of gas, the cost of serving whom, however, might be very high. Such difficulties and dangers are bound to exist it seems to me to the extent that any modification of the demand rate departs from the true demand principle, which disadvantage may greatly outweigh the advantage of simplification in the rate. I think it is also interesting to us in considering what the

electric companies have done, and they have certainly done a great deal, and put out some very satisfactory rates, to analyze to ourselves the exact difference in demand principle between our business and the electric business, considering this carefully for our own locality and conditions. First, we have one essential difference in the fact that we can store our product; they cannot. Another condition is that, in water gas plants, or combined coal and water gas plants, the investment cost of additional capacity is comparatively small as to the simple manufacture of gas, and that this capacity can be held as a reserve, and can be brought almost immediately into service at any time. This is an important difference as between gas plants, as strictly coal gas plants have not this advantage. Duplication of capacity in the electric business is costly. However, the electric business has one great advantage in its high tension distribution which allows the transmission of enormous volumes of current long distances at comparatively small investment cost. We have equalled this condition to some extent in our business by the application of high pressure distribution for transmission and for reinforcement of low pressure distribution systems, and to the extent that we have been able to make use of what we may call high tension gas distribution we have somewhat reduced the cost of demand from a distribution standpoint. I think we can all agree that the one-rate principle is wrong, and does not give justice either to customers or company, but as the president has suggested, it is going to be a very difficult thing to get away from it. The laws and ordinances are made by the masses who profit in the beginning by one price for all, who are unable to see the ultimate advantage of the widest possible expansion of the gas business, and who are much more interested in getting their gas cheaper at the moment than in any other aspect of the situation. It seems very clear that we will have to content ourselves in the main with alternative rates, and that these alternative rates will have to be somewhat higher than would be necessary if we were not forced to serve a great many customers below cost. It may be interesting in the future, in connection with the subject of rates, and especially in connection with the question of explaining the maximum demand rates, to consider the possibility of dividing up the various classes of business, as, for example, the telephone companies have done. It may be possible to divide the gas business of a community into residence service, with some such simple rate as the Commonwealth Edison Company is charging for residence electric service, and into store and other business and industrial service, with a more elaborate maximum demand rate for such service; that is, a simple rate easily explained, where the business is pretty much of one character, and a more complex but also more flexible rate where the business is of widely varying character. In the case of the latter business, with its larger scale of consumption, both the company and the customer are justified in taking time in an explanation and understanding of the rate. The residence customer does not want to be bothered, he wants a simple rate; but the head of a store or industry is willing to take the time to understand any rate that will be of benefit to him, and also generally has the intelligence to understand it. The difficulty of explaining demand rates is going to be mainly with the household business, and it is a possibility of the future that our business may be classified just as the telephone companies have classified their business. [Applause.]

The President—Mr. Wolff, will you tell us how long these rates have been in force and what the average receipts were per 1,000?

Mr. Wolff—Not exactly these rates, but something like them have been in force (applying only to the larger consumers) for some 7 or 8 years.

The President—They have been?

Mr. Wolff—Yes; but applying to present consumers, the present rate would be approximately 83 or 84.

The President—Mr. Goodnow, have you studied the rate question?

Mr. Goodnow—I can perhaps only repeat a remark one of my electrical friends made to me the other day, who asked me: "Have you made any change of flat rates?" "Nothing like the concern you are connected with," I replied. "Oh, I mean a uniform rate," he said; and, on my reply, "I haven't particularly," he said, "Well, we have educated the people up to a point where you can go ahead and probably develop something." And Mr. Rice has pointed out these changes that the people have, and which Mr. Wolff has divided up and which are similar but perhaps less complicated. I have a friend who lives in Evanston who is served by one of our local companies in the electrical business, and who the other day showed me a contract based upon a maximum demand rate for electrical service in a residence. He had a good sized one, and he asked me to aid him in comprehending it. I couldn't say I made it entirely clear to him, and he said he didn't understand it at all; but the man connected with the electrical company said, "I will guarantee you that your bills won't be quite as big after you sign this contract as they were before," and he said, "I am going to do it." He didn't try to comprehend it, although he is a man of a good deal more than ordinary intelligence, so perhaps we may think of the difficulties that we may encounter by trying to serve our people at a cost which is just to ourselves and to our customers. We are bound to meet with these difficulties, and I think it may be true our electrical friends have educated the people sufficiently so that we may have a starting point.

The President—I am afraid it would keep some of our electrical friends busy explaining how they arrived at these rates. Mr. Wolff, have you anything else to say in respect of your paper, for some of them seem to have gone after you?

Mr. Wolff—My study of rates is a matter of short duration, and I learned that I don't know very much about them. I want to answer some of the questions that Mr. Rice raised here. I worked out this table, Mr. Rice, on different sized demands and consumptions. Not many, perhaps 6 or 8. I found that within a fraction of a cent per 1,000, on the basis of hours' use of the maximum demand as determined by capacity of the meter, that there never was any greater variation in the price to be charged to different customer than their consumer cost would represent divided by their consumption. I appreciate the point that Mr. Rice makes about this method not being applicable to more than one company, and perhaps not to one company, for a long period of years. I worked this out for some 7 or 8 different companies, and the results are not appreciably different. I worked it out for 3 companies for a period of 6 years, and found just what Mr. Rice suspects. It isn't always applicable to the same company for a long period of years. You might have a change in conditions, you might have to change this schedule at intervals of say 5 years, something that perhaps we would do anyway. Our rates would be changed periodically as costs or conditions varied from time to time. Every time the question of charging for gas by some other method than uniform price arises somebody makes the point that it should be charged for on the readiness-to-serve basis, but one point that nobody has successfully tried to solve is how to determine the maximum demand. The information evidently isn't available, and until it is available I don't know how we are going to use it.

The President—Like the electrical men, make a good guess at it.

Mr. Wolff—Yes, the electrical man says so much for his first hour's use, and so much for the second hour's use and so on; but if he gets a really knotty proposition, he may shift the connected load, or active demand making it more or less as exigency of the case requires. I want to add some information here about holder capacity. I found from the data of some 10 or 12 gas companies, that there is a general relation between the holder capacity and the maximum daily output, and between maximum daily output and annual output. I have some figures which show that in 1908 the ratio of annual output to the maximum daily output of 10 companies, which are located in 4 different States, ran from 247 times to 294 times; in 1909 they ran from 226 times to 296 times, and in each case the company that had the 294 ratio and the 296 ratio was an Illinois Company. It seems to me that the question of maximum demand, so far as words capacity is concerned (unless we can get a very large volume of industrial business) is not going to be a very serious proposition. In the matter of interest, taxes and depreciation, I assign all on the works' capacity to output cost. Just a word about Mr. McPhail's letter. He raised the question whether the gas company can cut off a profitable consumer who wants to use large quantities of gas for industrial purposes during peak load hours. We put that provision in these contracts for the purpose of being able to say to a customer whose demand grew suddenly, in a section of the town where we were not prepared to supply it, or during a time of the year when the demands on our mains or plant were too great, as in November or December, "You can have that gas up to 4:30 or 4:45, but you cannot burn gas for this purpose at these rates from 4:30 till 7 o'clock, say from October 15 to February 1." It was simply a protection to enable us to control that business, and we thought we were entitled to do it in view of the advantage given him in the price.

Mr. Goodnow—Has Mr. Wolff made any distinction in that rate between water gas plants and coal gas plants; or is it regardless of either?

Mr. Wolff—Just as it happened to be. Some are all water gas—2 are water gas and 2 are coal gas, and 6 are coal and water gas com-

bined. I will be glad to give you the details of it if you would like it, and any explanation you desire.

The President—I can see no objection to putting in a clause of that kind in a contract like our electrical rates. In fact we have some very large customers who are willing to shut down during these hours in order to get a cheaper rate. I do no not see why it cannot be applied to gas. Would anyone else like to say a few words on this subject?

Mr. Parker—I was very much pleased with the talk Mr. Rice gave us. The question of rates for gas concerns our Company as it does yours at Springfield. We are going through like trouble, and it seems that the city is determined we shall make the same rate to all, regardless of our rights in the case. Had Mr. Rice much trouble in making the demand rate popular, and are the people as a rule satisfied with the rate?

Mr. Rice—You mean as applied to gas or electricity?

Mr. Parker—As to electricity. I would like to bring that in our town.

Mr. Rice—Why, I think the maximum demand electric rate introduced at Aurora is very popular. We have had absolutely no trouble in the power business, and, as applied to lighting, it has succeeded in putting a good many gasoline plants out of business where the gas department had failed. Recently we have been cancelling all the old special lighting contracts. I suppose every electric company of any age has a heritage of such special contracts, and it might seem as though there would be a great deal of dissatisfaction in getting customers who have had these comparatively low special rates for a number of years, considering themselves favored customers, to give up their contracts and agree to accept another rate. However, we have changed these people over to the maximum demand basis, and there has apparently been no dissatisfaction. In some cases they are paying a trifle more, and in other cases they are obtaining their current for a little less than before, but they all seem to be entirely satisfied. Further, in regard to this one rate for all propositions, I might suggest that the Wisconsin Commission has made one very interesting decision on that subject in the Manitowoc case, and one you can present to your customers, or the public generally, as a very illuminating discussion on the subject. The Commission says flatly that it is not discriminating to charge some customers less than others, but on the other hand, it is discrimination to charge one rate to all classes of customers, irrespective of the cost of service, and furthermore, that the one rate for all propositions is not good for the public as a whole in the end. The Commission thus strongly recommends the making of proper differential rates. Replying to Mr. Wolff, in regard to determining the maximum demand, so far as residence business is concerned, I quite agree with him, which is the reason I suggested the separate classification of residence business. I do believe, however, that it is possible to determine with reasonable accuracy the maximum demand of the store and industrial business by taking enough time for it, and I belive the business will justify it. We have recently experimented with a maximum demand gas rate for one large industry. The business has grown very fast; in fact, from 200,000 feet a month to 800,000 feet a month in less than a year, and we have had to determine the maximum demand from time-to-time. There has been no difficulty in determining and satisfactorily adjusting it, however, and we have a satisfied customer burning on a rate which can be defended not only in that community but in every other community that we serve.

The President—I would like to have you tell me how you got rid of that gasoline competition. In Peoria, we have gas and pretty good electricity, and we have about 250 gasoline consumers.

Mr. Rice—I would like to ask if you have any 3-cent current.

The President—Yes. We get down as low as 3 cents, but the machines are manufactured in Peoria, and when they get one that is worn out or out of order, they install a new one and we must all admit that they give a good light while new.

Mr. Rice—Well we have one gasoline lamp manufacturer in Aurora, but we have had a little trouble in doing away with the gasoline lamps with our maximum demand rate.

The President—It is still early, and if you want to talk gas—I really began to think I was in an electrical convention a while ago.

Mr. Fitzgerald—Mr. President, while I am not a member of your Association, I would like to say just a word. We have a rate at Gary, Ind., on electricity, and are going to put it in on gas, that brings out very strongly this point of giving the small consumer with the long hours an advantage over the large consumer with short hours. It will work out about as follows: If a man takes a 5-horse power gas engine, he will pay for 30 hours per month, at the standard rate of $1 per 1,000, and all over that which he uses per month he will get a rate of 70 cents. We apply the same rate in the electrical service as follows: For 1 hour per day multiplied by the rated horse power we get 7½ cents per kw., and for all over that we get 3½ cents per kw. For example, on a 1-horse power motor we get paid 7½ cents for 22 kw. hours and 3½ cents for all over 22 kw. hours.

The President—How do you generate your electricity?

Mr. Fitzgerald—We are generating it with gas engines. We have a 10 per cent. discount. It drops from 10 to 7 cents on the first 300 kw. hours sold, and all over 300 we sell for 7 cents per kw. hour.

The President—Where do you get your gas?

Mr. Fitzgerald—From the blast furnaces. That rate runs pretty well for a small consumer.

The President—I would like to get a little more information about this gas engine proposition. What does it cost you to run this gas engine?

Mr. Parker—What is the B.T.U. value of the gas?

Mr. Fitzgerald—The B.T.U. value is about 90.

The President—I don't suppose you have any more figures on that. I suppose your maintenance cost for equipment, etc., is more than your fuel cost?

Mr. Fitzgerald—I buy my current on a straight rate from the Steel Company.

Mr. Rice—I move a hearty vote of thanks to Mr. Wolff for coming out here and presenting us with this paper. [Seconded and adopted.]

A Plan of Window Display.

[For an illustrated description of this display, by Mr. G. H. Armstrong, see JOURNAL, *ante*, p. 855.]

Discussion.

The President—It is still early and I would like to have Mr. Goodnow explain this apparatus or device shown.

Mr. Goodnow—I was looking for the man who invented it here.

Mr. Armstrong—I am not the inventor of this; I wish I were. It has proved a very effective and novel window attraction. We installed this in our Lake Forest office about 3 weeks ago and have had quite a crowd looking at the window a good share of the time. Of course, at the last of the 3 weeks the interest of the device waned; but nevertheless we feel it has done very good work. The device is very simple. We used a 3-light reflexolier, turning this upside down, if I may use the term. For power we used a Cherrington water meter fastened to the main shank with cogs. To govern our water supply we used a globe valve, to which was fastened a solid wooden disk. On the face of this disk we fastened a string which was attached to a heavy weight. Then this was connected with an alarm clock so that at a certain hour the weight on the globe valve shut off our supply of water, thereby stopping the motion.

The President—The only thing we electrical men object to is that you did not use an electrical motor to operate it.

An Announcement.

The President—Our Secretary would like to make an announcement before the adjournment.

The Secretary—A member of the Entertainment Committee wanted me to announce that he has already sold 170 banquet tickets, and you will probably understand what he means when he says he would like to sell about 40 more.

The President—All of you gentlemen here who haven't purchased your banquet tickets are requested to buy one when you go out. Although it is somewhat early you probably will want to visit a little, and we will adjourn until to-morrow morning at 9:30 o'clock.

Second Day—Morning Session.

The meeting was called to order at 9·30 o'clock A.M., March 16, by the President, who said, the first paper this morning is by Mr. L. H. Johnson, on

SOME COMMENTS ON CERTAIN HIGH PRESSURE GAS DISTRIBUTIOF PROBLEMS.

[For the text of the Johnson paper, see JOURNAL, *ante*, p. 844.]

Having coucluded reading the paper Mr. Johnson added—Since writing this paper we have experimented with two gate valves tapped that way. Having first placed in it some of this black dust, we opened the vent hole and blew it clear, and were thus able to get the valve tight again. Of course, we haven't used it under working conditions, but I think it will give us practical results.

Discussion.

The President—Gentlemen, I realize your pressure is possibly a bit low after last night's blowout; but I hope you will call on your reserves sufficiently to go on with the discussion of Mr. Johnson's paper. Several of the gentlemen have prepared set discussion on this paper, one of whom I think is Mr. H. H. Clark.

Mr. Clark—I have listened to Mr. Johnson's remarks with much interest, and having previously read his paper, I have prepared a discussion, which if you will bear with me I will read. The paper, prepared by Mr. Johnson, indicates that problems such as he mentions are common with, in fact general to high pressure gas distribution. It is noteworthy, however, that these problems are being eliminated as this system of distribution is improved, and in the near future only minor problems will confront us. To eliminate these problems requires careful attention to chemical, physical and mechanical details, in both the manufacturing and distributing departments. The Northwestern Gas Light and Coke Company distributes carburetted water gas, compressed to 30 pounds, from three separate stations, to 43 towns and villages in Cook county. One transmission line is 36 miles long. Three systems of distribution are in use, namely, low pressure directly from the holder, low pressure fed from high pressure through district regulators, and strictly high pressure, in which gas is distributed directly to the consumers, Williamson regulators being used at each house. We have had no stoppages in our mains caused by the pitch-like substance referred to by Mr. Johnson, which substance evidently accompanies coal gas and not water gas. In our service, however, we encounter considerable trouble from a fine powder which is deposited around the regulator valve, causing the seat to stick or preventing the valve from seating, depending on certain conditions. This substance is present in the regulators as dust, in services as a coarse powder mixed with dust, and in mains in particles varying in size from an impalpable powder to single pieces weighing 90 milligrams. An analysis of this powder follows:

Material.	Per Cent.
Fe_2O_3 (iron oxide)	76.71
H_2O (moisture)	3.50
Oils	0.76
Carbonaceous matter	16.64
SiO (sand, etc.)	2.39
Total	100.00

This substance prevents satisfactory action of the gate valves in our lines, and in some cases seriously affects the meter. We remove as much as possible of this material (by blowing out the services and dead ends of mains) as conditions require. From the analysis, on account of the large percentage of iron oxide, carbonaceous matter and silica, it is evident that the pipes were not thoroughly cleaned out before being laid. In all our present street work we are very careful to remove all foreign substances from the interior of the main and service pipes. We have found that it is not good practice to heat pipes with live steam prior to coating the outside with tar, as the steam tends to start rusting of the interior of the pipes. Dry air, at the temperature required for coating, is more satisfactory. Pipe should invariably be stored in a dry place. In the manufacturing department we endeavor to make a gas which is thoroughly "fixed," so as to minimize the loss in candle power due to compression and distribution, and to prevent deposits of "condensate" after once compressing and cooling the gas. In this matter we have been only partially successful, because we find condensate as far as 16 miles from the works. To remove this, we are placing tanks at various locations in our main feeders, and expect to soon have this problem under control. A remarkable instance of the effect of these liquid or semi liquid deposits in mains is noted in an instance where we supply gas at low pressure through a district governor, reducing from 30 pounds to 70-tenths of water. Complaints began coming in from this area of no gas, mantles blackened, stoppages, etc. Most of the trouble was experienced in the gas arc lamps, in which the pilot lights would not re-light after burning the arc lamps for several hours. A chemical analysis indicated the presence of hydrocarbon oils, or vapors mechanically suspended in the gas, and we worked upon that theory. At a point 3,800 feet from the district regulator we found a complete "trap" in the high pressure feeder. At a point 40 feet from the regulator was another, but smaller, "trap;" both were found filled with condensate. The gas being under 30 pounds pressure was able to force its way through these traps, and in doing so picked up a portion of the liquid, carrying it mechanically. The entire regulator system contained, to the depth of an inch, a heavy hydrocarbon oil mixed with a small amount of iron oxide, which gave it a reddish-brown color. The gas passing through the regulator orifice carried with it some of the hydrocarbon oils mechanically suspended, which are thoroughly mixed with the gas in passing through the small opening of the reducing valve. These oils, being thoroughly mixed with the gas, traveled with it for a considerable distance, and gave the most trouble to consumers and in appliances having the largest consumption. This trouble was remedied by removing all foreign substance from the feeder, and by putting blow offs at the bottom of the traps, so that the condensate could be removed at any future period as required, it being impossible to re-grade the main on account of certain local conditions. At a point 100 feet from the regulator a tank was put in the high pressure line, which serves to remove all suspended matter from the gas. This work was done in September, 1909, since when we have had no complaints from the district. We have had instances of stoppage due to freezing, but expect to overcome this by the installation of tank drips and the subsequent removal of all foreign matter from the gas. We endeavor to supply a gas as dry and clean as possible, and to do this have placed, and are placing, tank drips of a special design in our main feeders. At present we have three methods of removing condensate and other foreign substances from the feeders; namely, through 1-inch taps in the bottom of the main, through tees in the line, faced downward, and by means of tank drips placed in the line. We have adopted the last method as the best, and are installing these tanks as rapidly as conditions demand. With these tanks all the gas enters at one end and passes through and out at the other end. They have a diameter 6 times that of the line pipe and are 16 times the diameter of the main in length. In passing through the tank the velocity of the gas is reduced to nearly $\frac{1}{36}$ of its velocity in the main and practically all mechanically suspended matter in the gas is deposited. A 1-inch standpipe is provided for removing all deposits from the tank. We use gate valves exclusively and find them satisfactory, although, in a number of instances, we have been unable to shut them absolutely tight, necesitating a stopper and vent pipe where work was going on. We find, by slowly closing a gate valve, then opening it slowly, then closing it and opening it alternately, 4 or 5 times in like manner, that any dry powder or similar substance will be blown from under the gate; but in some instances this method is not effective. In no instance have we found a gate valve, which has been in use a number of years, absolutely tight under 30 pounds pressure. In the matter of safeguarding consumers, we have adopted the Williamson "Combination Regulator and Mercury Seal," which operates satisfactorily between 1 and 60 pounds main pressure, giving any desired pressure in the house pipe. This regulator is equipped with a $\frac{3}{4}$-inch vent pipe, the outside opening being covered by a vent cap of special design, to prevent accidental closing of the vent by dirt and so forth, and to make it difficult for the consumer to plug up the opening. Service pipes are of $\frac{3}{4}$-inch wrought iron, the main is tapped $\frac{3}{16}$ inch and a $\frac{3}{4}$-inch curb cock having a $\frac{3}{16}$-inch bore is used, so that, in case of a complete failure of the regulator, the flow of gas would be restricted and the vent pipe could readily take care of the gas. However, we have had no regulator failures. We have had but one case of meter explosion and that was caused by the consumer plugging up the vent pipe. In this instance the meter was of 50-light capacity and gave way at the front middle seam. In another instance a consumer detected a leak, as he thought, and sent for a plumber. The plumber found gas escaping from the vent pipe and plugged it up. This stopped the leak, but put the pressure on the meter. A complaint man from the Company arrived about this time and found the meter leaking around the dial. He removed the plug from the vent and adjusted the regulator. This meter being of 5-light capacity, and smaller than the other meter, had withstood the high pressure, which was probably 15 pounds. In the matter of pressure we attempt to carry as high a pressure as possible to be consistent with economy in regard to loss of candle power, mechanical losses, cost of compression, leakage and accidents. We have adopted 30 pounds gauge as a standard and vary but a few pounds above or below this pressure. We have proved by experiment that the greatest loss of candle power when compressing carburetted water gas occurs between 5 and 20 pounds. Above this the loss is small in addition to that sustained when compressed to 20 pounds. The loss in pressure due to friction varies as the square of the velocity. The higher the velocity the more foreign material the gas is able to carry in suspension. For economical transmission the actual velocity in the mains should not exceed 20 feet per second. These facts indicate, that with higher pressure, and consequent lower velocity, we obtain better

economy. We found that a pressure of 30 pounds would keep the velocity in our feeders below 20 feet per second, and as this was considered an economical pressure in regard to loss of candle power, mechanical losses, cost of compression, leakage and accidents, we adopted it as our standard. The question of smallest main has been decided upon from the points of capacity, velocity and loss of pressure, not upon leakage; the latter we have minimized by the use of extra heavy, recessed couplings, full weight line pipe and leak clamps. We have adopted 2-inch as our smallest main. This Company uses patent couplings or expansion joints every ¼ mile and elsewhere, as conditions necessitate, not only for their value as expansion joints, but to provide an easy place to break the line in case of repairs or the placing of tees or crosses for additional laterals or feeder. In one case where we had a 6-inch valve with patent couplings within 20 feet of the valve on each side, the contraction due to a cold winter split the valve in two, showing that the expansion joints were perfectly rigid in this instance and failed to act in the intended capacity. However, we use patent sleeves, tees, crosses, etc., in our pipe lines, as we prefer these to threaded fittings, on account of the ease of manipulation. In case of leaky line couplings in pipe which is already made up, we use leak clamps. In addition to using patent couplings and fittings on main feeders we aim to put a valve every ½ mile with a patent coupling about 4 feet beyond the valve. All intricate areas are valved in in every direction, and all laterals have separate valves. In these areas we use patent fittings exclusively. These conditions insure ease of manipulation in making repairs. Insulation joints are used where the main passes under or alongside of electric railroads, the number used depending on conditions such as electrical leakage, kind of soil, intensity of electrolysis, etc. In conclusion, I wish to say that this Company is constantly striving to perfect its manufacturing plants and distributing systems and will gladly discuss problems with anyone interested in high pressure gas distribution.

The President—Although very few of us ever had any experience in high pressure distribution, I am quite sure that this paper and the discussion will be of interest to all. I trust that every member here who has had any experience will relate his troubles or his advantages. We would like to have both sides of it. If any other member knows anything about the distribution of gas under high pressure we would be pleased to hear from him.

Mr. W. H. Morton—Mr. Chairman, I am not a member of your Association, but I would like to ask a question or two with your permission. We are distributing under high pressure, but we make and pump our gas into tanks. We have 4 of these, about 40 feet long by 8 feet high, and are figuring on distributing under high pressure very soon. I would say, of course, we have gate valves on the plant and on our high pressure line, but we find we cannot make them hold. I would like to know about the tap they put on the valves. How big is it?

Mr. Johnson—¾ inch.

Mr. Morton—I would like to know where the check is placed. I came in a little bit late and didn't hear all of the paper. I would also like to know if the check is used in connection with the governor, or do you use both of them? We have pretty cold weather up there, about 32° min. Our mains were put in by a construction company, who used bushings and a few other things that made trouble. They put in very few expansion joints—some brass, others cast iron. We had only one break this year, right at a connection where there was a "T," about ¼ inch just below the latter. We had three breakages last year. We found they pulled apart as much as ¾ inch. We are remedying that by putting in these expansion joints. Another point I wanted to mention is: There were several plants, something on our order, up there, where they distribute, make and pump gas into these tanks, then distribute from there, under what they call high pressure; but it is only about 1½ pounds. I was wondering whether under 1½ pounds pressure it is necessary to have these checks for safety.

Mr. Johnson—We made a test of two 3 inch gate valves. We tapped a ¾-inch hole in the body and then put some of this dust under the valve disk, putting pressure on both sides, which would be the working conditions under which the gate valves were operated. We put enough dust under the disk so the valve would not hold tight, then blew this out, and by opening the blow-off in the body, worked the disk up-and-down or until we were able to get the valve tight. We tried it several times, each time successfully. I don't know how it is going to work, but I think it will answer the purpose. The check valve is put in between the lock-cock and the regulator. I don't think it would be necessary, under the low pressure that you have mentioned, to put on these checks.

The President—Mr. Lee, of the Wireless Telephone Company, would like to make an announcement.

Mr. Lee—Gentlemen: Mr. Davis, Superintendent of South Chicago Gas Company, suggested to me this morning that I tender you an invitation to attend the demonstrations of the wireless telephone at the La Salle Theater to-day at noon—the theater is across the street from here. I am very pleased to say to you that I have reserved all of the boxes and some of the seats, and, on behalf of the Collins Wireless Telephone Company, which I represent here in this city, I will be very happy to extend that invitation to you to be my guest and to occupy the boxes and other seats that are necessary at noon to-day. This demonstration will last about 20 minutes and each one of you will have an opportunity of hearing these wireless telephones talking from the bowling alley next to the theater. [The invitation was accepted, with thanks.]

Mr. Lee—Thank you, Mr. President. It may interest you to know I have a letter from President Taft, thanking me for the arrangements I have made to equip his suite of rooms in this hotel with wireless phones. And I am very glad you appreciate it.

Mr. Rice—Is the mercury seal that Mr. Clark uses in combination with the regulator or is it a separate appliance?

Mr. Clark—It is a part of the regulator.

Mr. Rice—Well, in that case, I would like to ask you further whether you have ever made any tests as to how much gas will pass under the conditions stated in Mr. Johnson's paper. In other words, if you have ever taken one of your combination regulators, broken the diaphragms, connected a meter and a regular blow-off pipe about 20 feet long and tested to see what would happen in case the valve was leaking and 40 pounds pressure blowing through it.

Mr. Clark—We made a test recently, using a Williamson regulator. Connection was made to a 6-inch main by means of 60 feet of ¾-inch service pipe, main tapped $\frac{3}{16}$ inch, with a ¾-inch curb cock, tapped $\frac{3}{16}$ inch, and a lock-wing service cock of like bore. The vent pipe was made of about 12 feet of ¾-inch pipe having three ell bends. The leather diaphragm was cut ¼, then ⅛ and finally ¾ way round on the side nearest the opening to the vent and full pressure of 30 pounds turned on. The maximum pressure observed in the house pipe was 22 inches of water.

Mr. Rice—I am not familiar with your particular regulator, but in the combination regulators I have seen, it is necessary for the gas, in order to reach the vent pipe, to pass through very restricted openings; and we find, in spite of the fact that the initial opening at the main is small and that there is a further restriction at the lock cock, if we have 30 pounds initial pressure and a broken diaphragm, we can get as much as 15 or 20 pounds pressure against the meter. I want to bring that fact out, because there is the reason for these safety checks being introduced into the system which Mr. Johnson speaks about; and I am curious to know if you have made any tests in that direction.

Mr. Clark—We haven't made many tests in blowing out gas, but the regulator is so designed that, after the gas once gets into the service pipe, all those things are unrestricted as far as the size of the opening is concerned. I think the opening is ¾ of an inch right through the machine, and the seal itself is about ⅝ of an inch. I am quite confident about that. We use a very small head of mercury, of course, which offers practically no resistance. Whenever a seal does blow out the gas dispels all the mercury, leaving the venting practically open and unrestricted.

Mr. Johnson—We have practically the same conditions that you have. We drill our main with a ¼-inch drill. The gas then goes through a lock-cock with a $\frac{3}{16}$ hole. It is again restricted in the regulator itself, the valve of which is $\frac{3}{16}$ inch. The seal, which is a combination seal, is $\frac{5}{16}$ diameter and 2 inches long. We have a 3-inch vent pipe, the same as you. In spite of this, whether the diaphragm is broken or not, we can get considerable pressure on our meters. As to the other case I mentioned, where the diaphragm is ruptured and the leather pulled over the hole, the seal is shut off entirely—I do not know whether your regulators are that style or not. If you are familiar with the Reynolds regulator you will notice that if the diaphragm breaks along the outer edge it may fall across the vent hole, and the seal is then useless.

Mr. Clark—In this Williamson regulator the opening is almost full size. There is quite an indentation in the casting, and quite a hollow in the bottom. It is almost impossible for the diaphragm to seal over the gas at all, the opening to the seal being near the center of

this regulator. For that reason there is a very large hollow in the bottom of the regulator, and I cannot possibly see how gas coming through a $\frac{3}{16}$ opening, with the atmosphere on one side and the house pipe on the other, could get much greater than the atmospheric pressure.

Mr. Johnson—You would get about 4 or 5 pounds?

Mr. Clark—Possibly; and that would not be very dangerous.

Mr. Johnson—You say that would not be dangerous. It would be, in some meters.

Mr. Clark—Yes, probably in large meters.

Mr. Johnson—Or an old meter.

Mr. Bradley—I want to say, in answer to Mr. Rice, that I tested 9 regulators under 20 pounds pressure, and 18 inches was the most pressure we could get in the house pipe by throwing the regulator wide open and leaving the seal open. There is no radical difference between these two regulators.

The President—Mr. Morton, would you mind answering a few questions about your plant? I am rather curious to know how you distribute with tanks. You said you pumped your gas into the tanks and then distributed from them.

Mr. Morton—We make it in a small holder, and that we pump through an Ingersoll-Rand compressor into these tanks up to about 75 pounds. We thus make and pump just about even, and when we get through making we close off until we want to make again.

The President—And you are distributing from your tanks into the main?

Mr. Morton—Yes, sir; we have two governors, one of which reduces the pressure from the tank down to 5 pounds, the other from 5 pounds down to working pressure. During the load the gas goes pretty rapidly through these governors.

The President—You stated before that you had trouble with your mains breaking. Have you a wrought iron system with screw joints?

Mr. Morton—Yes.

The President—There is no provision made for expansion?

Mr. Morton—Well, we have put in 4 or 5 expansion joints now for the 9 miles of mains.

The President—Yes; but they don't expand.

Mr. Morton—As I said, they were put in by a construction company. They didn't give us a very good job. We have had considerable trouble with mains of late. They are pretty shallow, about 3 to 5 feet underground; and, as I say, it gets pretty cold.

The President—That is hardly deep enough for 32° below zero, is it?

Mr. Morton—And we had that little experience with their breaking.

The President—How much gas do you distribute, Mr. Morton? What is your maximum output per day, with the tank system that you have?

Mr. Morton—Our maximum output last winter, I think, was about 80,000—between 75,000 and 80,000 in 24 hours. We are running now about 45,000 to 50,000.

Mr. Battin—As I understand it, that is simply a system used with pressure tanks instead of holders; in other words, they don't use any holder. Is that right?

Mr. Morton—It saves the cost of a holder.

Mr. Battin—That system is used in the way of economizing on the first cost until the business warrants putting in a holder. Regarding this black dust which seems to be the cause of a great deal of trouble, that isn't found in the distribution of manufactured gas alone; you will find it also in natural gas lines. I was very much interested at the Gas Institute meeting of 1908, when Mr. Rice said it was largely due to the fact that the lubricating oil caused the deposition of this powder, and I would like to know whether Mr. Rice has gone any further into the question of whether it is the lubricating oil that causes the deposit?

Mr. Rice—Well, we have changed our opinion on that; I will have to take that back.

Mr. Battin—Another thing in regard to expansion joints. For instance, in steam plants the joints will stick. Of course, in a steam plant you have a certain amount of heat; and lubrication is used there—the conditions are ideal—so, if an expansion joint is going to stick in a steam plant, you may be sure that it will stick tight in a high pressure gas distribution system. Steam engineers have adopted an expansion joint consisting of corrugations of the pipe itself, or rather a coupling made up with corrugations about 2 or 3 times the size of the pipe. Then inside of this coupling arrangement is a sleeve just the size of the bore of the pipe. This provides for considerable movement in all directions and particularly lengthwise. Of course, there is no chance for leakage, and there is nothing that steam engineers have found to cause the thing not to work properly, and I am surprised the high pressure gas men have not tried that coupling.

The President—Mr. Battin spoke of the expansion joints sticking in the steam systems. We have been operating a hot water system and a high pressure steam system, and we have expansion joints in both of these. We have never experienced any trouble with these joints. Of course, we repack them every year before the heating season begins.

Mr. Battin—That explains it.

Mr. Johnson—I might add a word in regard to the experience of Mr. Reimers, of Moline. While talking to him yesterday about it, he said they put in a 6-inch line from Moline to Rock Island and had about 10 breaks in the line. He said the couplings did not pull apart in any place. It was always in the steam fittings where he had T's, or crosses. These breaks average about 2,000 feet apart. After they broke they would pull apart about $\frac{1}{4}$ of an inch, but $\frac{1}{4}$ of an inch would not account for the full expansion or contraction in 2,000 feet.

The President—What is the practice in laying a high pressure line? How often do you put in these expansion joints?

Mr. Johnson—Every 500 feet.

Mr. Battin—I don't think there is any question about the pipe sliding in the ground. I know of an instance where a pipe 600 feet long, coming down the side of a hill, in the summer would apparently slide down the hill, and in the winter would not go up again. We would have to dig that pipe up every year, and where we had a sleeve the ends of the pipe would be ground right into each other.

The President—Don't you think some of that was due to the effect of frost?

Mr. Battin—I don't say it was. I simply say it was that way.

Mr. Johnson—Pipe will move in the ground, in certain soils, loose gravel and sand. Where we steamed out that pipe at Elgin there was quite a movement, some 5 or 6 inches.

The President—I should think in a gumbo soil it would stick close to the pipe and create quite a skin friction.

Mr. Johnson—Yes, it remains stationary there.

The President—I wonder whether Mr. Price or Mr. Busch has shown up? Well, Mr. Goodnow is here now. Mr. Goodnow, what do you know about high-pressure distribution?

Mr. Goodnow—Well; I just came in and haven't heard the discussion.

The President—There are others.

Mr. Goodnow—Reading over Mr. Johnson's paper, the question he raised about the safety devices on the regulator interested me a good deal, although I haven't anything to offer about it; only to express a desire to know more about it, how that may be overcome. The danger, of course, we want to avoid. Should the governor fail to act and throw the pressure on the meter, in that case it is dangerous. In case that does give out, it is certainly serious, although I can say in our own installation, we have never had that trouble. We have never had a case happen that way.

The President—Where do you install your meters on the high pressure system; in the basement?

Mr. Goodnow—Just the same as we do in any other place, any house meter.

The President—Isn't that a little bit dangerous?

Mr. Goodnow—We don't consider it so, with these safety devices.

The President—They have mentioned other cases where the side of the meter blew out. I should think it would be dangerous to have it in the basement.

Mr. Goodnow—It certainly would. But, as I have remarked, we have never had a case like that in our experience, although we have had several thousand of these meters set that way.

Mr. Rice—I want to make an attempt to clear up, if possible, the discussion on this safety check, and especially to make it clear that the Western United Gas and Electric Company is not in any way interested in this device. It was invented by one of our employees who has since left us, and who holds the patent, and we have purchased only the right to make the check for our own use. Now, the danger that we fear in the regulator is this: In case the diaphragm breaks, you have gas on both sides of the regulator at once, and its pressure on the meter will depend first, on the initial pressure; second, on the restriction imposed by the orifices at the main and lock cock; third, on the amount of gas through the two vents in the regulator, one below and one above the diaphragm. The only question, therefore, is whether these vents leading from both sides of the diaphragm chamber will be sufficient to take care of the amount of gas

passing the openings below the regulator. In other words, whether their resistance is greater than the resistance of the initial openings, and if so, how much greater? To the extent that the resistance is greater, pressure will be thrown upon the meter. That is the whole question, and in our experiments with the combination regulator and seal which we use we found that in many tests the total flow was not taken care of by the two regulator vents and a heavy pressure was thrown against the meter. Now, two conditions may cause this: First, the main vent hole leading through the mercury seal to the open air may become partially or wholly stopped by the broken leather diaphragm falling over it, thus leaving only the orifice above the diaphragm, which is altogether too small in itself to take care of the flow. Second, this upper orifice may be partially or wholly stopped by carelessness of workmen in repairing the regulator at some time or other. Both sides of the regulator and the leather diaphragm itself must be accurately faced for this upper vent hole to remain fully open. If stopped up, that much of the capacity the regulator has for venting itself in case of a broken diaphragm is lost and the safety flow that much restricted. At first glance, it seems as if the vent through the mercury seal, this being larger than the orifice in the lock cock, should be entirely sufficient in itself to take care of all the gas that could flow to it; but this vent is not an orifice, only a small length of pipe of small diameter, and, as you know, an orifice will pass a very much greater amount of gas than a piece of pipe of the same or nearly the same size, even if the latter be only an inch long. But, theoretical considerations aside, the main points are these: We took a number of these regulators at random, broke the diaphragms, set them up and found that while in some cases we got very little pressure against the meter, in others we got a very dangerous pressure; and also, we have had the real, practical experience. We have had two meters blow up from no other cause than ruptured diaphragms in regulators properly vented, and all theories in the world would not convince us that there is no danger in this condition. To be on the safe side we believe that either the initial pressure must be low or a safety check like the one under discussion must be used or the mercury seal be redesigned. Now, unfortunately, we have a great many mercury seals in use and cannot afford to change them; and also, we cannot in all cases reduce our pressure by the use of master governors, so we have taken up this safety device and propose to use it until something better is invented.

The President—Are your vent pipes carried outside of the building?

Mr. Rice—Yes, sir; and as far as possible from any window.

The President—The reason I asked you this question is it was stated here that a consumer notified them that he had a leak and had stopped up his vent pipe.

Mr. Rice—One other advantage of this check is worthy of attention. In case the regulator valve becomes dirty the pressure will often rise to the blow-off point and the vent pipe will take care of the escaping gas. The escape may then go on for some time without any notification on the part of the consumer. In fact, he will probably know nothing about it unless he happens to smell the gas from the vent pipe, as he will probably not notice particularly the difference in pressure. Therefore, danger may exist for a considerable time, either from the escaping gas itself, or from the more serious possibility of some one discovering the escape and stopping the vent pipe, thus throwing the full pressure on the meter. The advantage of the check under these circumstances is that, as soon as the gas begins to blow through the vent pipe, the check will close, the consumer will not have any gas at all, and he will immediately give the notice that will lead to the proper measures being taken.

The President—Mr. Goodnow, have you collected your thoughts?

Mr. Goodnow—Mr. President, I have collected what I was thinking about. The thought occurred to me, in reading over this paper yesterday, that this deposit may be iron carbide from faulty purification. We have never had that difficulty in any of our pipe lines mentioned by Mr. Johnson, and it occurred to me, as a suggestion, that this might be an iron carbide formed there through the gas acting on the purifying material or from some other source. The analysis seems to point that way a little. The materials have such a large percentage of iron, that it might be that, and the carbonaceous matter may be accounted for by the excess of lubricating oils in lubricating the compressors. We had that difficulty until we put on automatic lubricators. After putting on the automatic forced lubricators, we used about as much oil in a week as we used formerly in a day. It did away with this deposit which we found in the mains and which was not thin enough to run into the drips, but gummed orifices in places where it was very annoying. Since doing that we haven't had this trouble. It seems this deposit that Mr. Johnson speaks of might be a combination of the lubricating oil and perhaps the iron carbide. That is only a suggestion, however, as to the question of patent couplings. It is a practice in the natural gas country to put a patent coupling on every joint of pipe, a 16 or 18-inch, down to 4-inch pipe. In some of the artificial gas mains they have done the same thing, only with smaller sizes, of course, usually 6 and 8-inch. With a patent coupling at every joint, I don't think there is any trouble in the moving of the gas pipe by its expansion or contraction. I have observed them changed very frequently where the joint was put in as an expansion joint every 400 or 500 feet or even 200 or 300 feet, maybe. It has been a source of difficulty in trying to make an ordinary coupling of the ordinary length act as an expansion joint. It almost invariably loosens and rolls the gasket, sooner or later causing a bad leak at that point. While the sleeve, so-called by the makers, which is probably 13 inches long on a 4 or 6-inch pipe, put in that way, hardly ever gives out in that manner. The use of patent couplings on artificial gas mains perhaps hasn't been sufficiently lengthy to teach us whether it is going to destroy the rubbers in any way, but I can say we have one installation where the sleeves have been in use nearly 10 years, and in most of these cases, practically all of them, there have been no ruptures. Some of the joints have been broken by taking up the pipes, and these gaskets have been found to be almost vulcanized by the pressure and could not be torn apart except by destroying the rubber. However, they were tight and looked as if they might last for another 10 years. I think that is as long as anybody has had any experience with this thing in the artificial gas business; but if we have any who have had longer experience, we would like to hear how they came out.

Mr. Miller—I have had a little experience with that black powder and I don't think it is altogether true that it comes from the gas. I will tell you why I think so. I laid about 9 miles of pipe last summer and my plan in laying this pipe was to get the customers hooked up to it as soon as possible. Consequently I ran the initial pressure up to 65 pounds for testing and supplying at the same time. I located gate valves about every ½ mile, and as soon as I would get ½ mile of main and lateral completed I would close the gate valve and start supplying service. After I had about 4 miles of this 4-inch pipe laid I came to a place where there was a turn in the main and had to put a T on its head, as my intention was to run about ¾ of a mile of 2-inch main further on. When the 2-inch intersection was made and the valve was put on the end, we then went on with the 4-inch main in the other direction about ¼ of a mile and completed the 4-inch main. We started and ran 400 or 500 feet from the 2-inch intersection and found that when we opened up our 2-inch valve to test we could not get a bit of gas there. So we took up the pipe and found that the 2-inch pipe from the valve over to this "T" was entirely filled with a powder-like substance. So there was an absolutely new line that hadn't been in use for more than a month that was full of it. The pipe delivered for this job did not lay on the street more than 2 or 3 days before it was used. It was stacked up in the works on the ground about 2 weeks before it was used, and it may have been that in hauling this pipe out and along the street, it got full of road dust and the pressure on the inside simply passed it along until it got into this place where the gas could not blow it out.

The President—What kind of gas were you distributing?

Mr. Miller—Coal gas. This had mixed in it quite an amount of small iron scale. So I am satisfied that that isn't from the gas itself. We have a booster line about 1¼ miles long, of 2-inch pipe, which has been in use about 3 years, and none of that powder was found in it. The line that we ran was run from this booster line; we never had a particle of this black powder before we ran that new line. Another thing, about the drips on this line. In that 9 miles of pipe we have practically but 2 drips out on the line. Both are about 2,000 feet from the plant and this is the only place that we get any condensation. We have to draw this off about once a week. On this booster line we originally put nothing but an ordinary siphon drip, and would blow it out at stated periods. At this time of the year or when the thaw comes on, we have more condensation than ordinary and we found we had pushed this main full of water. It had to get up over a long hill and it ran almost to our regulator. We took about 3 or 4 barrels of water out of it and it ran on down through the line. At some places we had to draw it out of services in basements. We took a 4-inch piece of gas pipe, plugged it at both ends, putting a regular service tap on the top. The end we took out to the curb and put on a siphon with a cock, so we could blow it out

at that point. Then we found that the drip riser would hold enough water, between blowings and pumpings, so that the water left in there would be frozen. We adopted a plan of running a regular house service connection from this drip pot, and put a stopcock in so that the man could reach in and turn the cock on with a service key and blow it out, leaving the drip riser free from water, which did away with the freezing.

The President—Mr. J. A. Rafferty, Chemist of the Peoples Gas Light and Coke Company, of this city, is with us; we will hear from him.

Mr. Rafferty—Several problems are pointed out in this paper which demand the immediate attention of gas men, and these problems seem of recent origin. The problem which appears to me of serious moment is stoppages in the mains. While this feature is encountered more by the distribution men, it should concern the manufacturing men, too, because they are responsible perhaps to some extent for the trouble. It seems to me that if a remedy is to be found it must be applied at the works. A thorough discussion of the question would necessitate more data than at hand. The cause of the trouble is subject to conjecture. However, a few suggestions other than Mr. Johnson makes may be of assistance. It is well known that, up to certain pressures at least, the candle power of gas diminishes as compression is increased. A pressure of 60 pounds, which the author says is sometimes attained, should cause considerable condensation. We would expect this latter to be taken care of in the drips; but such evidently does not seem to be the case. The non-volatile matter, of which the author speaks, may be distributed along the mains, and being comparatively dry it may absorb some of the drip oil. This combination of non-volatile matter and drip oil may mix, first, to the consistency of molasses and, finally, through a churning and evaporative effect, result in a black powder. This statement seems substantiated by the fact that most of the carbonaceous matter is volatile, as the author states. In this connection I would like to ask Mr. Johnson if he has not found this deposit other than in the powder form, and if the ground temperature did not cause a variation in the consistency of the deposit? Now, as to the source of the iron oxide. This may to some extent come from the mains, but I am inclined to think that a considerable part may come from the purifying boxes. The author, who is conversant with the method of purification, might enlarge on this point. If small particles of iron oxide and wood shavings pass over with the gas, we could account for not only the iron oxide but also the ash content found in the analysis. If, as the author suggests, this organic matter, which he designates as coal tar pitch, is a polymeric modification of some of the constituents of the gas, that would make it a works' problem as to the proper adjustment of heats. I do not think this is the case. Also, if this substance exists as vapor, it is a subject for the condensers or scrubbers, provided, as I infer from the author's statement, it exists as tar. If this substance is also found in low pressure mains, such fact exempts high pressure from being the cause of it. In conclusion, I would like to ask Mr. Johnson the temperature of the compressed gas at the works and what precautions, if any, have been taken to modify the evil at the works?

The President—We will extend a vote of thanks to Mr. Johnson, for his paper certainly has brought out quite a discussion. The next paper, by Mr. F. E. Newberry, is on

TAR MACADAM ROADS.

[For the text of the Newberry paper, see JOURNAL, *ante*, page 847.]

Having concluded reading the paper proper, the author continued: I would like to refer now, gentlemen, to page 39 of the pamphlet. The cut as shown on that page exhibits a block of tar macadam roadway not swept or cleaned since the day it was opened for traffic, although it has been in use for 21 months, and it was left in that condition because we have no active street cleaning force or gang in that section of the city. Regarding the dark lines along the street, I have been asked since the convention began, whether these showed where the tar had broken through. As all of the photographs, excepting the one as to the bridge, were taken late in the fall, the street is full of refuse and leaves that will simply have to lay there in the gutter until removed. I call your attention to "Exhibit B," showing the west side of a 600-foot concrete bridge treated with road oil; the west side just opened for traffic—the view is taken looking south. The oil was permitted to lie on the surface for 2 days prior to the opening of the bridge for traffic. I might state that the left hand side of this cut, as you look at it, was the side treated with oil and had not as yet had any traffic or wagon over it. It is just as it was that morning. When I heard they were going to open the street, I hustled around and got a photograph of it before any traffic passed over the street. I may also call your attention to "Exhibit D," which shows the same bridge. This picture was taken some 4 or or 5 hours after the bridge was opened for traffic. You will notice the lines showing there where the wagons going over it had picked up some of the road oil and carried it on, sometimes 3 or 4 blocks. You will also notice that the road oil is scattered around in little blocks all over the street there, showing that the road oil had not been given time to penetrate into the stone where it belonged. If you will look at "Exhibit D," which also shows a section of the same bridge, doesn't, of course, show where the wagons have taken up the oil as in the prior cut. Referring to "Exhibit E," showing a street in the process of cleaning, which ought to be done twice each year, the greater part of this refuse is loose, shale rock. I took the pictures of "Exhibits E and F" simply to show the amount of refuse that will accumulate where the ordinary macadam road is used, and also showing the amount of refuse that we have to pick off of these streets. This must be done by wagons and men, and it is somewhat expensive, in fact when you consider we have 40 miles of this kind of roadway, it is very expensive, and this cut shows the amount of refuse which washed in to the gutters. We have got to pick it up, and it is a good idea to convert it into shale rock again and sell it to the city. [Laughter.] Now, "Exhibit G" speaks for itself; it is simply a street gang removing the refuse from the street.

The President—As the paper by Mr. Sharples is practically on the subject treated by Mr. Newberry, we will have them read and discusssd together to save time.

The President introduced Mr. T. P. Sharples (Boston, Mass.), who read the following paper entitled:

THE TAR TREATMENT OF ROADS.

[For the text of the Sharpless paper, see JOURNAL, *ante* p. 850.]

Discussion.

The President—Who will start the discussion?

Mr. Miller—In what proportion was the tar used in mixing the preparation applied on these roads?

Mr. Sharples—15 to 18 gallons of tarvia to a ton of stone.

Mr. Miller—Isn't it a fact that a layer of stone is first put down on the road and the live tar poured over that?

Mr. Sharples—The penetration method, as it is called, has been most commonly used, as shown in the pictures with the tank wagon. The stone is spread over the road surface and then the hot tarvia is spread. You cannot spread it cold, since it is too viscous.

Mr. Miller—Well; is any more material added to it? You put the tarvia on, then some stone, then the tarvia, and roll it again?

Mr. Sharples—Yes. Some material is always put on the surface.

Mr. Clarke—As I understand it, this paper has to do with the manufacturers. The thing of importance to us little gas fellows is the 2½ cents a gallon that we get for tar. I think we are much more interested in the first paper, because it gets down to where we live. I would like to ask Mr. Newberry if his company has borne the cost of the treatment of the roads with tar, or was that expense borne by the city?

Mr. Newberry—I might say in that connection, that the city has not carried the experiment any farther than as originally made. There was a reason for this. There was under consideration about 20 blocks of new streets at the time this experiment was made, and it was the idea of the city fathers at that time to still take the money from the general fund and tar the streets as the experimental block was laid; but, owing to a controversy which came up about making macadam streets out of the general fund or having a special assessment levied, unfortunately the proposition was knocked in the head and it has since laid in a dormant condition. I understand, however, that whatever street building is done, will be done by a direct special assessment on the property owners. If you take into consideration the amount of money spent on the block in question (nearly every average block has eight 50-foot lots to a side, taking both sides, we have 16 lots) an assessment of $5 per lot for every 50 feet, would be ample to meet cost of tar-coating or dressing of this kind. The contention was made that, if it were separated into an assessment on the property, the property-owners would see that it would be so costly that they could not afford to take hold of it. We have at this particular time other streets in the city that are to be paved with this so-called "Sarco," and so it is going to be a question of what we are going to do on some of the cross streets, or some of the streets where the special assessment can be levied, and the proper

pressure brought to bear on these streets to stand that $5 assessment. It seems to me, taking the experiment and the paper as read, the prime idea is to get away from this 2½ and 2¼-cent price of tar. I think we have that with us now. The average small gas companies have all that they want. What we want is a better market for our tar. If we can create a better market through this medium of top dressing for roads and streets, then every man connected with the gas companies should talk tar dressing.

Mr. Mitchell—I think Mr. Newberry has clearly shown that tar macadam is the cheapest and best road for our traffic of to-day. In Joliet we have a macadam road paid for by special assessments. This road was built with crushed limestone, quarried in Joliet, varying in size from 1½ to 2½ inches. Our Company was anxious to promote the sale of tar, and believing that the tar macadam road was a success, and would be the means of getting a better price for our tar, we secured permission from the city authorities, and the owners of the abutting property, to experiment with tar on this road. We first tried pouring the tar on the road as it was, but found it rolled so hard and compact that the tar would not penetrate the top dressing of the road. We found it useless to follow out this plan, so we got a harrow, weighted it, and, with a team of horses hitched to it, loosened the road bed to the depth of 1½ inches. We then poured on the tar, using a common, 5-gallon sprinkling can, with a special nozzle hav- perforations in nozzle ⅛ inch in diameter. We thoroughly covered the entire road bed, using 1½ gallons per square yard. Then, with garden rakes we worked the tar in with the stone, then covered it with 2 inches of fine limestone screenings, rolling it thoroughly with a 20 ton steam roller. We closed the street to traffic for 1 day and swept the loose screenings from the surface of the road bed. We took the ordinary coal gas tar, placed it in a closed, cylindrical tank, vented to the air, and separated the water contained therein by heating it 24 hours to a temperature of 200° by means of a steam coil. We then transferred it to a large tank wagon and hauled it to the street, which was a mile from the works. The temperature of tar when applied was about 175°. This road was completed the 1st of September, 1909, and to-day, although there has been a great deal of heavy traffic, it does not show any signs of wear. There are a great many things pertaining to the practical use of tar that should have the earnest attention of the gas fraternity. I can remember when tar brought from 5 to 6 cents a gallon, but to-day we are getting little more than 2½ cents. Of course, no doubt more coal gas tar is being made to-day than was being made 10 years ago; but there are also many more purposes to which tar may be applied. So I cannot understand why the price has been reduced, for the cost of pitch and other by-products of tar remains the same. It seems to me that the additional uses certainly must offset the increase in the output; still tar brings less than it did. My judgment is that tar for road building to-day, if a standard was given to the city authorities, under which to work, so they would be able, in making specifications, to show the kind of tar (and how it should be treated) to make a good road. They are at a loss to know and how to proceed, for there seems to be no one posted sufficiently to tell them just what to do. I am convinced that, if you ask six gas men as to the proper way of putting tar on a road, also the treatment it should receive, each one of the six would have a different plan of procedure. Hence, it seems it would be a wise thing for this Association to appoint a committee of "live wire" to make experiments and determine the proper treatment that should be given tar; also, as to the best kind of stone for which tar would be the most satisfactory binder. Tar macadam really has no other competitor, for a tar macadam would not cost to exceed $1.15 per square yard, whereas asphalt costs from $2 to $2 25 and brick from $1.65 to $1.80 per square yard. The life of a tar macadam road certainly exceeds the life of an asphalt road. The best any of the contractors will give us is a 5-year guarantee on asphalt. Tar is just as dustless, just as solid and has the advantage of not being as slippery in wet weather as asphalt. A brick road will probably last longer than either the asphalt or the tar macadam, but it has the disadvantage of being noisy and costing one-third more than tar macadam. Thus, tar macadam is cheaper, is the easiest of construction and just as durable. I think the proper thing is to appoint a committee who will give this subject a thorough investigation and advise all of the members of this Association as to the treatment tar should get and the stone that should be used; and, if it is impossible for the fnnds of the Association to be used for this purpose, then the companies, I believe, should get together and make up a fund to carry out the test.

Mr. Bestor—Perhaps you will be interested in knowing that the United States Government has been making some experiments in regard to the effects of motor travel on the roads. They have ascertained that it is not the suction of the wheels of the motor that tears up your roads. The front wheels do very little damage. It is the tangential stress of the rear wheels which pushes down on the roadbed with such force as to dig up and ravel the road.

The President—Mr. Goodnow, can we hear from you?

Mr. Goodnow—I haven't anything in particular to say, but I would like to have the Association tender a vote of thanks to Messrs. Sharples and Smith, who assisted him in presenting this paper to the Association, as you will observe at considerable expense, in bringing Mr. Sharples from Boston and providing the equipment. I think the whole tendency of making a market for tar on roads will increase its price automatically, and that surely will benefit the gas companies who furnish the tar by extending its use over the country widely. I would like to include in that motion thanks to Mr. Newberry also, for a good deal of work on this subject in preparing the paper.

The President—I think both of the gentlemen are entitled to a vote of thanks. Of course, the average small gas company is not prepared for this thing. It is rather an undertaking for them to go into the roadbuilding business. I think it would be better for the gas companies to get together and experiment as to which is the best method of applying it. [Motion approved.] We should also extend a vote of thanks to the Entertainment Committee for the entertainment provided last night. Although it was a little swift for a staid old Presbyterian like myself, it was alright. I, therefore, ask you to extend a vote of thanks to the Entertainment Committee for the very agreeable amusement they gave us last night. [Adopted, and a rising vote of thanks was accorded.]

Mr. Clarke—Mr. President, in order to bring the matter before the Association, I would to move along the line of suggestion made in the paper, that a committe be appointed for the investigating for the use of tar in road making.

The President—Hadn't you better amend that motion by suggesting that the Board of Directors take up that matter to determine whether or not it would be advisable to appoint such a committee. It is a pretty broad proposition. Would you object to such an amendment?

Mr. Clarke—I haven't any objection to the Board of Directors taking up the question, if that course is considered the wisest; but I will tell you frankly that the question of the disposal of tar and its use on our roads prompted me to attend this meeting. I think the gas companies are outraged in the present disposal of their tar. I see in this proposition a solution of the matter, and when I see the splendid results that have been obtained in Kankakee it strongly suggests equal results in my town and many others if we can only be shown how to go at it.

The President—You must remember Kankakee has only put down one block.

Mr. Channon—The State of Illinois built ½ mile of tar macadam road at Mount Sterling last summer. I don't know whether the State or the city of Mount Sterling paid for it; but it was put in under the supervision of the State.

The President—Gentlemen, I know the Engineer of the State Board very well. He lives in Springfield, and I will talk with him, to see if we cannot get the State to take up this matter. The State is building different kinds of roads, macadam and others, and we will try to get them to put in a tar road.

Mr. Rice—I offer as an amendment to the motion that the matter be referred to the Board of Directors, with the request that they consider the subject and take such action as may to them seem best, and especially that they bring the matter to the attention of the State Board, which is experimenting on good roads. [Amendment accepted by Mr. Clarke, and the motion as amended was declared adopted.]

A Supplemental Membership Batch.

The President—We have the names of certain gentlemen who have made application for membership.

The Secretary read the names as follows:

Connor, P., Salesman, LaPorte (Ind.) Gas Meter Company.
McAfee, D., Gen. Supt., Galesburg (Ills.) Railway and Light Company.
Rovitz, A. H., Secretary, Peerless Light Company, Chicago, Ills.

The President authorized the Secretary to cast the ballot of the Association for the election to membership of the gentlemen named, which action was subsequently reported as having been taken.

REPORT OF COMMITTEE ON OBITUARY RESOLUTIONS.

Mr. Pratt, from the Committee, read the following resolutions commemorative of the death of Mr. Fred. R. Persons:

"This Association, in meeting assembled, recognizes that, in the death of Fred. R. Persons, it has lost a faithful, enthusiastic and loyal member, one whose presence is missed at this meeting and will continue to be missed at all future meetings. He was ready at all times to render assistance in everything that went for the comfort and pleasure of its members and the success of its meetings; in fact, whether they were of this or kindred associations; therefore,

"*Resolved*, That in his death we have lost a good friend and member, whose memory we shall ever cherish.

"*Resolved*, That a copy of this resolution of our friendship and esteem be prepared and mailed to his wife and family.

"*Resolved*, further, That this resolution be made part of the record of this meeting."

The President moved the adoption of the resolution, in which Mr. Eustace heartly concurred, remarking that his only regret was that he found himself unable to add anything in the way of a more fitting tribute to their departed friend. Mr. Pratt had, by his resolution, voiced the sentiments of each member of the Association whose privilege it was to know Mr. Persons during life and it would suffice to say that the members of the Illinois Gas Association will cherish the memory of their big-hearted, whole-souled brother, who had been called to the life beyond. He then offered a second to the resolution. [The motion was unanimously carried by a rising vote.]

A FORMAL VOTE OF THANKS.

Mr. Rice—I would like to move that we extend a hearty vote of thanks to our Chairman, our Secretary and our Technical Committee for their able and careful work in preparing and carrying on this meeting, which we have all so much enjoyed. I will ask Mr. Eustace to put the motion. [Seconded.]

Mr. Eustace—We all appreciate the work performed by the officers of this Association during the past year and this has special reference to our Secretary, who has done an enormous amount of work. You have heard the resolution, that the thanks of the Association be extended to these gentlemen. [Unanimously adopted, amidst applause.]

The President—I thank you, gentlemen, on behalf of the Technical Committee and the Secretary. They have done the work. I have done nothing. If there is nothing more, we will adjourn this, the sixth meeting of the Illinois Gas Association. I hope you have all enjoyed being here. I have appreciated your strict attendance on the business meetings, and we all had a jolly good time last night. The Association stands adjourned.

Efficiency Trial of a Setting of 18 Vertical Retorts at Mariendorf.

The Journal of Gas Lighting reports that a communication by Mr. E. Körting, General Manager of the works of the Imperial Continental Gas Association in Berlin, to the *Journal für Gasbeleuchtung* of the 1st January, contains his observations on different modern methods of carbonization, including the Woodall-Duckham and Dessau vertical retort settings, the Glover horizontal retorts, and large carbonizing chambers. The paper concludes with the reproduction of a report by the German Association's Instructional and Experimental Gas Works at Carlsruhe, on an efficiency trial conducted by that Institution at the Mariendorf works at Berlin, on a setting of the Dessau type containing 18 instead of the customary 12 retorts. In summarizing this communication the *Journal* says:

The Instructional and Experimental Gas Works undertook the efficiency trial, at the request of the Imperial Continental Gas Association, and carried it out from the 31st of October to the 5th of November. The setting differed from the ordinary Dessau type in that it contained 18 instead of 12 retorts; but it occupied only the same ground area. Instead of two rows (placed one behind the other) each containing 6 retorts, there were in this setting 3 rows of 6 retorts of smaller cross section. In elevation and in dimensions the new setting so closely resembled the previous beds of 12 retorts, that it was installed in a bench between two of the latter, and was only noticeably different through the alteration of the mechanical discharging equipment. For making the trials, this setting was connected with the apparatus of the experimental plant at the Mariendorf works; so that the gas which was produced in the setting was condensed, purified and measured apart from the gas coming from the other settings. All the precautions taken in the previous efficiency trials on a bench of settings of 12 vertical retorts, which were made in May, 1908, were observed in the present set of observations.

The bed of 18 retorts had been at work in normal conditions for a considerable time before the experimental run, and had been heated by the use of coke produced as to two-thirds from English (Boldon) coal, and as to one-third from Silesian coal. During the trials, the same coke was used for heating the setting. It contained on an average 12.4 per cent. of ash, and had a calorific power of 12,561 B.T.U. per pound. The retorts were charged with large coal from the Concordia Mine in Silesia. They had been scurfed 8 days before the trials were started. The coke produced in the trials was, by desire of the management of the works, not used for firing the setting (as already mentioned), in order that the regular working of the producer should not be disturbed for the experiment. The Concordia coal used contained 2.91 per cent. of water (on drying at 110° C.), 4.28 per cent. of ash, and 92.81 per cent. of combustible substance or coal proper. The ultimate analysis of the coal showed that its percentage composition was as follows, the figures in brackets being the percentages on the combustible substance or ash free and dry coal: Carbon, 78.14 (84.19); hydrogen, 4.79 (5.16); oxygen and nitrogen, 9 (9.76); sulphur, 0.88 (0.95). The coking test showed a yield of 65.10 per cent. of coke; the flame being luminous and only slightly smoky. The coke was well caked, and of a shining grey character. The proximate analysis showed a yield of 60.82 per cent. of coke free from ash and moisture, and 31.99 per cent. of volatile matter; or, if reckoned on the ash-free and dry coal, 65.50 per cent. of dry and ash-free coke, and 34.50 per cent. of volatile matter. The coke contained 6.59 per cent. of ash. The net calorific value of the coal was 13,315 B.T.U. per pound, or, on the combustible coal substance, 14,346 B.T.U. per pound.

The most suitable time for working off the charge had been ascertained by previous trials to be 10½ hours, with admission of steam during the last 2 hours. The trials were begun on October 31, at 5:30 P.M., and continued until 2 A.M. on November 5. They thus comprised five periods of 21 hours each. A summary of the results obtained is given in the appended table:

TABLE I.—*Results Obtained with the Setting of 18 Vertical Retorts, October 31 to November 5, 1909.* [Charges worked off in 10½ hours, with steaming for the last 2 hours.]

	Total for 105 Hours.	Average for 24 Hours.
Weight of coal (air dried) charged into the setting	85.575 tons.	391 cwt.
Average charge of coal (air dried) per retort = 1,065 lbs	.....	2,434 lbs.
Make of gas (at 60° F., 30-inch bar., and saturated)	1,150,180 cu. ft.	262,898 cu. ft.
Do., do. per ton of coal	.....	13,430 cu. ft.
Coke used as producer fuel—		
Per ct. by weight of coal carbonized.	.....	11.8
Per 1,000 cubic feet of gas	.....	20.02 lbs.
Quality of gas—		
Gross calorific power per cubic foot.	.....	542.6 B.T.U.
Illuminating power in Carpenter burner, at 5 cubic feet per hour	.....	10.0 candles
Specific gravity	.....	0.445
Nitrogen in gas	.....	1.2 per ct.

In regard to the figures recorded in this table, it may be observed that the coal was exactly weighed for each experimental day of 21 hours, and a sample was taken as it was introduced into the coal bunker. The coal remaining in the bunker at the end of the day was weighed, and the amount was deducted from the weight of coal put in, in order to find the amount charged into the retorts. The charging and discharging of the retorts throughout took place in an entirely satisfactory manner. The temperature of the setting was very uniform all through the trial. The fuel consumed in the producer was ascertained twice for periods of 48 hours. The quantity of coke was weighed, and while being carefully sampled was introduced into a bunker. That remaining in the latter at the end of the period was afterwards weighed and deducted. The producer was clinkered at the start. The quenched coke was collected and weighed in the usual manner, and the quantity was reduced to the equivalent of dry coke. The amount of ash in the coke was determined and the quantity of quenched coke was calculated to coke of the original contents of ash. The quantity of coke is given on the absolutely dry basis. The weight of coal is that of air dried coal. The charges of the retorts in the first two 21-hour periods were heavier than in the subsequent ones. It

was observed that when the retorts were dischared the coke from the lower part was still giving off gas. Hence on the third day more coke breeze was introduced into the retorts. For the fourth and fifth periods of 21 hours, however, the quantity of coke breeze was reduced again, and the space available for the charge of coal was thus increased. These changes in the amount of the charge, taken in conjunction with the effect of the admission of steam, explain some variations which occurred in the make of gas per ton of coal, especially a difference in the third period. On the average, the amount of coal charged into the setting in 21 hours amounted to 342 cwt.; and per retort per 10½ hours, to 1,065 pounds. The yield of gas per 21 hours was 230,036 cubic feet, of an average gross calorific power of 542.6 B.T.U. per cubic foot. The table shows the total figures of the five experimental periods, and also the results per 24 hours. It will be seen that the quantity of coal carbonized in 24 hours amounted to 391 cwt. for the setting, and 2,434 pounds per retort. The make of gas amounted, on the average, to 262,898 cubic feet, at 60° F., 30 inches bar., and saturated, per 24 hours. The make per ton of coal averaged 13,430 cubic feet, at 60° F., 30 inches, and saturated, with a gross calorific pow er as already stated. This is equivalent, including the water gas produced by the admission of steam, to 24 4 per cent. of the calorific value of the coal carbonized.

The illuminating power and specific gravity of the gas were determined; but the results do not call for comment. The amount of nitrogen in the gas was small, as no air was introduced for purification. The consumption of 20 pounds of coke in the producer per 1,000 cubic feet of gas made shows that for every 100,000 B.T.U. obtained in the gas 45,700 B.T.U. were expended in the coke used as fuel.

The following tabular statement gives a comparison of the results obtained in the setting of 18 retorts with the corresponding results obtained May, 1908, with 12 vertical retorts.

TABLE II.—*Comparative Results of Trials with Dessau Settings of 12 and 18 Vertical Retorts.*

	Setting of 18 Retorts.	Setting of 12 Retorts.
Date of trial	Nov. 1909	May, 1908.
Coal carbonized in 24 hours, cwt	391	275
Gas made in 24 hours, cubic feet	262,898	190,183
Coke used as fuel in 24 hours, pounds	5,185	4,341
Gas made per ton of coal (at 60° F. and 30 in.), cubic feet	13,430	13,815
Gross calorific power of gas, B.T.U. per cubic foot	542.60	536.70
Coke used as fuel—		
Per 1,000 cubic feet of gas made, pounds	20	23
Per 100,000 B.T.U. in the gas made.. pounds.	3.64	4.25
Per 100,000 B.T.U. in the gas made.. B.T.U..	45,700	53,400

The trials were conducted by Dr. K. Bunte and Herr Sentke, of the Instructional and Experimental Gas Works, with the collaboration of Dr. Geipert, of Mariendorf.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

956,531. Automatic Gas Fixture. E. M. Johnson, Philadelphia, Pa.

956,572. Gas Lamp. R. M. Dixon, East Orange, N. J., assignor to the Safety Car Heating and Lighting Company.

956,734. Process of Manufacturing Methane or of Mixtures of Methane and Hydrogen. P. Sabatier, Toulouse, France.

956,818. Automatic Water Regulator for Gas Producers. J. P. Naun, Philadelphia, Pa., assignor of one-half to G. Schilling, same place.

956,868. Gas Fire Lighting Device. C. C. Vail, Columbus O.

956,943. Mantle Sewing Machine. S. Cohn, New York City, assignor to the Machine Mantle Sewing Company, same place.

957,006. Method of and Apparatus for Producing Gas. E. E. Slick, Pittsburgh, Pa.

957,007. Gas Producer. E. E. Slick, Pittsburgh, Pa.

957,082. Meter Register. L. H. Nash, South Norwalk, Conn., assignor to National Meter Company, New York City.

957,342. Automatic Gas Burner. R. G. Jamison, Pittsburgh, Pa., assignor of one-half to C. M. Patterson, same place.

957,358. Gas Burner. E. Meyer-Zimmerli, Zurich, Switzerland, assignor to G. Schmid, Kreuzlingen, Switzerland.

957,445. Inverted Incandescent Gas Light. A. E. Shaw, Philadelphia, Pa., assignor to the Pennsylvania Globe Gas Light Company, same place.

957,476. Gas Lamp. A. Rector, New York city, assignor to Rector Gas Lamp Company, same place.

957,591. Controlling Device for Gas Burners. J. V. Wengelin, Gottenborg, Sweden.

957,790. Globe for Protecting Mantles. A. P. Nelson, Le Beau, S. D.

Items of Interest
FROM VARIOUS LOCALITIES.

MR. F. E. SCOTT, for some time connected with the shops of the Brooklyn Union (N. Y.) Gas Company, died the morning of the 9th inst., at his residence, No. 1228 Pacific street, after a long illness. Deceased, who was the son of Hattie A. and the late John E. Scott, was born in Jersey City, N. J., June 8, 1875. He was a graduate of the Engineering Section of the Stevens Institute of Technology, Class of 1905, and gave every promise of attaining high rank in his chosen profession. He is survived by his wife.

WE understand that the proprietors of the Lyons (N. Y.) Gas Light Company and the Wayne County Electric Company, have decided not to renew their applications to the Town Board for perpetual franchises to extend their services throughout the town of Lyons. Our informant adds: "The franchises asked for differed so much from those which the Board was willing to assent, made compromise impossible."

RECENT advices by way of Springfield, Ills., are to the effect that the Economy Light and Power Company, of Joliet, Ills., took possession of the properties of the Ottawa (Ills.) Gas Light and Coke Company, and will eventually hook these up by a high pressure pipe line to that of the towns of Marseilles, Seneca, Morris, Joliet and Streator.

MR. HENRY BARTLETT, General Superintendent of the Mechanical Department of the North Station Pintsch system plant, Boston, Mass., recently notified the men that an increase in their wages' rate, amounting virtually to 9 per cent. all round, had been ordered, the increase to take effect from the 13th inst.

THE executive officers of the Hamburg (Pa.) Gas and Electric Company, which we recently noted was the result of the combining of the properties of the Hamburg Gas Company and the Hamburg Electric Company, are: President, Solon D. Bausher; Treasurer, Chas. D. Burkey; Secretary, Wm. O. Heinly.

WE are indebted to "G. F. N.," for the following, from Portland, Ore., under date of the 10th inst.: "Honor was paid Mr. Guy W. Talbot, as he retires from the General Managership of the Oregon Electric Company to become head of the Portland Gas and Coke Company, by the officials of the Oregon Electric Railway Company in a banquet given last week in the Commercial Club. Mr. Talbot was the subject of many admiring tributes from those who have been his associates in building up the traffic and the profits of the interurban railway line. To these he responded gracefully, and with deep feeling, emphasizing his regret that the passing of events brought severance of pleasant business relation. Judge C. H. Carey, as Master of Ceremonies, indited a telegram addressed to President George Barclay Moffatt, of the Company in New York, which that gentlemen subsequently acknowledged later on. In behalf of the guests assembled Judge Carey presented Mr. Talbot with an unusually beautiful loving cup, to which Mr. Talbot responded with grateful words of appreciation. A unique feature of the table decorations was a complete electric railway, which operated without stop until the festivities were concluded."

AT the annual meeting of the shareholders of the Carlisle (Pa.) Gas and Water Company the officers elected were: Directors, L. R. Brenneman, F. C. Bosler, Wm. M. Henderson, Jr., R. S. Hays and J. Kirk Bosler; President, John Hays.

"P. M. D," writing from Altoona, Pa., under date of the 17th inst., says: "I note the JOURNAL reports the resignation of Mr. W. B. Perkins, General Manager of the gas plant here since 1906. While we all regret his going from us, we nevertheless are pleased over the

fact that his assuming charge of the Hartford City (Conn.) plant, means a decided advance for him in a business way. Up to now, Mr. Perkins' successor here has not taken charge, but these other changes may be of interest. Miss Annie Nolan, who has been head bookkeeper in Altoona for quite a while, goes to Shamokin, Pa., where she will act as Office Manager for the Shamokin Gas Company; and Miss Agnes Masterson goes from a clerkship to the Cashier's desk. And the girls all seem happy."

ADVICES from Revere, Mass., under recent date, are: "I failed to find any mention recently in your columns of the doings of the Suburban Gas and Electric Club, which is made up of the employees of the Revere and Winthrop divisions of the Suburban Gas and Electric Company. The monthly meeting for May—this will be the last regular session until September next—was more than usually enjoyable, the guests including the Rev. Francis L. Beal, of Beachmont, and Messrs. A. B. Tenney and H. T. Sands, officials of the Suburban Company. The Club's clever little publication, 'Light,' made its regular appearance, and it is needless to add that it did great credit to the cleverness of its editor, Mr. I. H. Sternberg."

THE new water gas plant constructed on the works of the Wakefield (Mass.) Municipal lighting plant—it is rated to a maximum output of 200,000 cubic feet per day—was started recently, without a hitch, and quite up to the guarantee of its constructors.

AT the annual meeting of the proprietors of the New London (Conn.) Gas and Electric Light Company, the officers elected were: Directors, Walter Learned, Carlos Barry, B. P. Learned, A. M. Young, W. G. Bushnell, M. J. Warner and A. J. Campbell; President, Walter Learned; Vice-President, Billings P. Learned; Secretary, A. J. Campbell; Treasurer, W. J. Warner.

CHARTERS were issued on the 14th inst. to Messrs. John Mortz, Wm. J. Bart, Horace L. Priest, D. J. Slattery and F. J. Otterbein, for the right to construct and operate gas companies, entitled: Gilberton Gas Company, Castle Gas Company, Frackville Gas Company, New Philadelphia Gas Company, Saint Clair Gas Company, Palo Alto Gas Company, and Gordon Gas Company. These places are all in Schuylkill county (and fairly contiguous to each other), Pa. The people mean business, too.

THE proprietors of the Middletown (Conn.) Gas Light Company have announced another reduction in the selling rate, the same to become effective the 1st prox. The gross rate is cut to $1.20 per 1,000 cubic feet, with a reduction of 10 cents per 1,000 for prompt payment. The Company's reconstructed (in fact, new) electric plant at the foot of College street will soon be tried out to the extent of enabling the Company to make a considerable concession in its electric schedules.

MR. J. F. LANNON and associates have asked the authorities of Susquehanna, Pa., for the right to there construct and operate a gas works.

"C. S. E.," writing from Cleveland, O., under date of the 16th inst., notes that the Gage County Gas Light and Power Company, of Beatrice, Neb., will soon commence the erection of a modern electric plant on the Blue river, at a point half-way between Beatrice and Holmesville. A concrete dam, costing not less than $20,000, will be built, which it is estimated will furnish 500-horse power, fully adequate to operate the dynamos. During the flood seasons, when there is a probability that the equipment at the dam will be out of commission, will be equipped at the gas plant the machinery in this secondary plant to be operated by gas engines. The plant is to cost about $90,000, and will be one of the latest and most up-to-date in the State. Work will commence July 1 and is to be finished October 1.

CABLE advices to "Pierson, New York," dated the 13th inst., are to the effect that the Supreme Federal Court of Rio Janeiro, Brazil, has refused the application of Messrs. Guinle & Co., and the Compania Brazileiro de Energia Electrical from installing underground or overhead cables for the distribution of electric currents in any part of the federal district, and on the islands of the bay of Rio de Janeiro as well. The effect of this action is to confirm the monopoly of the Rio Gas Company, one of the subsidiary concerns of the Rio de Janeiro Traction, Light and Power Company. The concession which was recently obtained by the Compania Brazileiro de Energia Electrical was granted by the Mayor of the city of Rio de Janeiro, without the necessary authority, consequently is not valid, for under the organic law of the country no franchises of this character can be granted by the Mayor without prior authorization of the Municipal Council.

IT is authoritatively stated Messrs. A. J. Hood and W. D. West, of Detroit, have purchased the plant and franchises of the Oelwein (Ia.) Gas and Power Company, and will reconstruct the same. Mr. West, who is Secretary and Manager of the new concern, will have charge personally of the betterments.

MR. OLIVER PRESCOTT, JR., representing the New Bedford (Mass.) Gas and Edison Light Company, recently appeared before the Board of Gas and Electric Light Commissioners and argued in favor of the petition submitted by the Company some time ago for the right to increase its capital stock. There was no opposition, and the Board took the matter under advisement.

MR. L. R. TAYLOR, writing from Louisville, Ky., under date of the 14th inst., says that if the pending negotiations are satisfactorily completed, to which termination all concerned are looking, the Paris (Ky.) Gas Company, now controlled by Mr. A. M. Dolph, of Cincinnati, will succeed to complete ownership in the Paris Electric Light Company; wherefore the properties shall be operated under one management. The City Council not long ago ago adopted an ordinance under which the Electric Light Company was empowered to transfer its franchise.

MR. T. R. ALLSTON, writing from Enid, Okla., under date of the 12th inst., incloses this story from the *Oklahoman* of the day prior: "Claiming as unjust, unreasonable and illegal the scale of rates (sliding principle) put into effect not long ago by the Oklahoma Gas and Electric Company, the White Swan Laundry Company has instituted injunction proceedings in the Superior Court. Complainant asserts that it had the contract with the defendant for a certain rate, and that this new rate is over that named in the terms of the contract. Upon the statement that the supply of gas was threatened to be cut off for non-payment of the bill under the new rate, Judge Munden signed a restraining order, setting a nearby date for hearing as a temporary injunction. The plaintiff alleges that it is in business at 525-527 West Second street, and that the Company is operating under a charter from the city, which gives it the exclusive right for the sale of gas and electricity in Oklahoma City. The contract alleged was made last September, by which gas was to be furnished at the rate of 15 cents per 1,000 cubic feet, less 2½ cents if paid by the 10th of the month. The laundry charges that, relying on contract, it purchased special machinery, going to great expense, that can only be operated by gas, control of the latter being under the complete direction of the Gas and Electric Company. The laundry, according to the petition, uses about 45,000 cubic feet per day, and the change of rates means a loss of about $24 a month. It is averred that the meter, from March to April, read 1,399,000 cubic feet, for which the defendant is proposing to charge $244.51, instead of $174.87, the sum which plaintiff claims is the right one under the contract. While this action is brought singly in the name of the White Swan Company, it is understood that other laundries, similarly instanced, advocated the testing of the question, after a failure to come to an agreement with the Gas Company after a conference."

BIRMINGHAM, ALA., has ordered 4 benches of silica brick bench settings from the Evens & Howard Firebrick Company, of St. Louis. The contract includes 24 "Star" retorts. Intensified production is necessary, as no change has been made in the retort house capacity at Birmingham since 1907. The Gas Company's business was never in healthier state than it is to-day.

MR. RICHARD WILLIAMS, known well to the residents of Utica, N. Y., as the unmistakable bookkeeper of the Utica Gas and Electric Company, became a benedict not long ago. The occasion was deemed a suitable one by his fellow employees to show their appreciation of his all-round worth, and they accordingly presented him with a beautiful lamp of the Welsbach type.

THE proprietors of the Myerstown (Pa.) Gas and Fuel Company have determined to extend the main system to and through the outlying boroughs of Richland and Womelsdorf.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

MONDAY, MAY 23, 1910.

The Market for Gas Securities.

Three-quarters point off is the net record for Consolidated for the week, the quotation being as of yesterday (Thursday) afternoon. This figure is used because the Stock Exchange was closed for several hours to-day as a token of the brokers' regard for England's late King. While this office is not given greatly to paying homage to Kings or Queens, it is nevertheless true that never was a King closer to his subjects and their ways than was Great Britain's dead Monarch. *Salvum fac Regem!* The condition of gas affairs in this vicinity is extremely satisfactory.

Lacledes are showing decided strength, which remark also applies to both classes of the Massachusetts Company's shares. Keep your attention on Washington gas. The "move" which will be soon made in these shares will astonish even some of their holders.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

MAY 23.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	135⅝	138
Central Union Gas Co.—1st 5's, due 1972, J. & J.	8,000,000	1,000	98	101
Equitable Gas Light Co.—Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River—1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	145	147
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106½	107
Yonkers	200,650	500	190	—
Out-of-Town Companies.				
Bay State	50,000,000	50	.65	.70
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	90	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	73½
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	106½
Cincinnati Gas and Electric Co.	20,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,600,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	113	113½
" Bonds, 5's	10,500,000	—	103	103½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis	10,000,000	100	103½	103⅝
Preferred	2,500,000	100	90	95
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	83¼	—
Preferred	25,000,000	100	87½	—
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	107⅜	107⅝
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—1st Mtg. 5's	751,000	1,000	100	102
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	1,600,000	200	355	362
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	361	—

Advertisers' Index.

New advertising, or changes in standing ads., to assure attention the issue following their reception, must be in hand on Wednesday.

AMMONIA CONCENTRATORS.
Bartlett-Hayward Co., Baltimore, Md. 1025
Fred Bredel Co., Milwaukee, Wis. 1022
Michigan Ammonia Works, Detroit, Mich. 1004
The Gas Machinery Co., Cleveland, O. 1007
Western Gas Construction Co., Fort Wayne, Ind. 1032

BURNERS.
Wm. M. Crane Co., New York City 1016

CEMENTS AND CONCRETES.
C. L. Gerould, New Castle, Pa. 1020
Ernst Strassburger, Chicago, Ills. 1020
Glidden Varnish Co., Cleveland, O. 1004
Laclede-Christy Clay Products Co., St. Louis, Mo. 1020

CHARGING BARROWS & COAL WAGONS.
Davis & Farnum Mfg. Co., Waltham, Mass. 1024
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1027
The Stacey Mfg. Co., Cincinnati, O. 1028

COKE CRUSHERS.
Bartlett-Hayward Co., Baltimore, Md. 1025
C. M. Keller, Columbus, Ind. 1023

CONVEYORS—ALL KINDS.
Bartlett-Hayward Co., Baltimore Md. 1025
Brown Hoisting Machinery Co., Cleveland, O. 1010
Cruse-Kemper Co., Ambler, Pa. 1012
C. W. Hunt Company, New York City 1024
Fred Bredel Co., Milwaukee, Wis. 1022
G. A. Bronder, New York City 1021
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1027
The Gas Machinery Co., Cleveland, O. 1007
The Stacey Mfg. Co., Cincinnati, O. 1027
Western Gas Construction Co., Fort Wayne, Ind. 1032

EXHAUSTERS.
Connelly Iron Sponge & Governor Co., New York City 1031
Connersville Blower Company, Connersville, Ind. 1028
Davis & Farnum Mfg. Co., Waltham, Mass. 1024
Isbell-Porter Company, Newark, N. J. 1003
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1027
Piqua Blower Co., Piqua, O. 1018
The P. H. & F. M. Roots Co., Connersville, Ind. 1015

GAS AND WATER PIPES.
Davis & Farnum Mfg. Co., Waltham, Mass. 1024
Donaldson Iron Co., Emaus, Pa. 1016
R. D. Wood & Co., Philadelphia, Pa. 1031

GAS BLAST FURNACES.
American Gas Furnace Co., New York City 1003

GAS COALS.
Berwind-White Coal Mining Co., New York and Phila. 1022
Westmoreland Gas Coal Co., Philadelphia, Pa. 1028

GAS COCKS.
H. Mueller Manufacturing Co., Decatur, Ills. 1015

GAS ENGINEERS.
Bartlett-Hayward Co., Baltimore, Md. 1025
Cruse-Kemper Co., Ambler, Pa. 1012
Davis & Farnum Mfg. Co., Waltham, Mass. 1024
Drakes Limited, Halifax, England. 1005
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Evens & Howard Firebrick Co., St. Louis, Mo. 959
Frank D. Moses, Trenton, N. J. 1006
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Frederick J. Mayer, New York City 1026
Henry I. Lea, Chicago, Ills. 1004
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William A. Baehr, Chicago, Ills. 1004
William W. Randolph, New York City 1017

GAS ENRICHERS.
Standard Oil Co., New York City 1023

GAS GAUGES.
The Bristol Co., Waterbury, Conn. 1016

GAS GOVERNORS.
Chaplin-Fulton Mfg. Co., Pittsburg, Pa. 1031
Connelly Iron Sponge & Governor Co., New York City 1021
Evens & Howard Firebrick Co., St. Louis, Mo. 959
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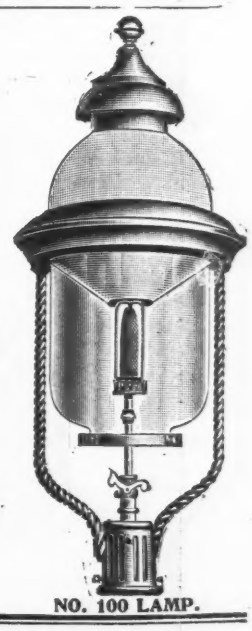

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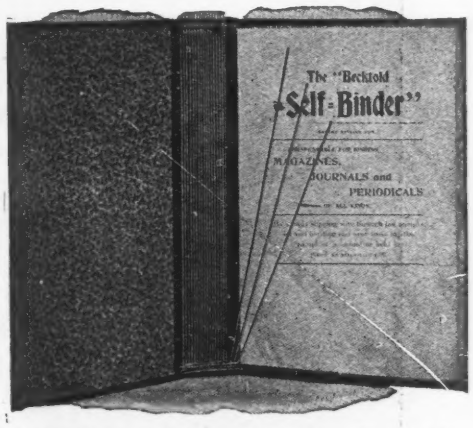

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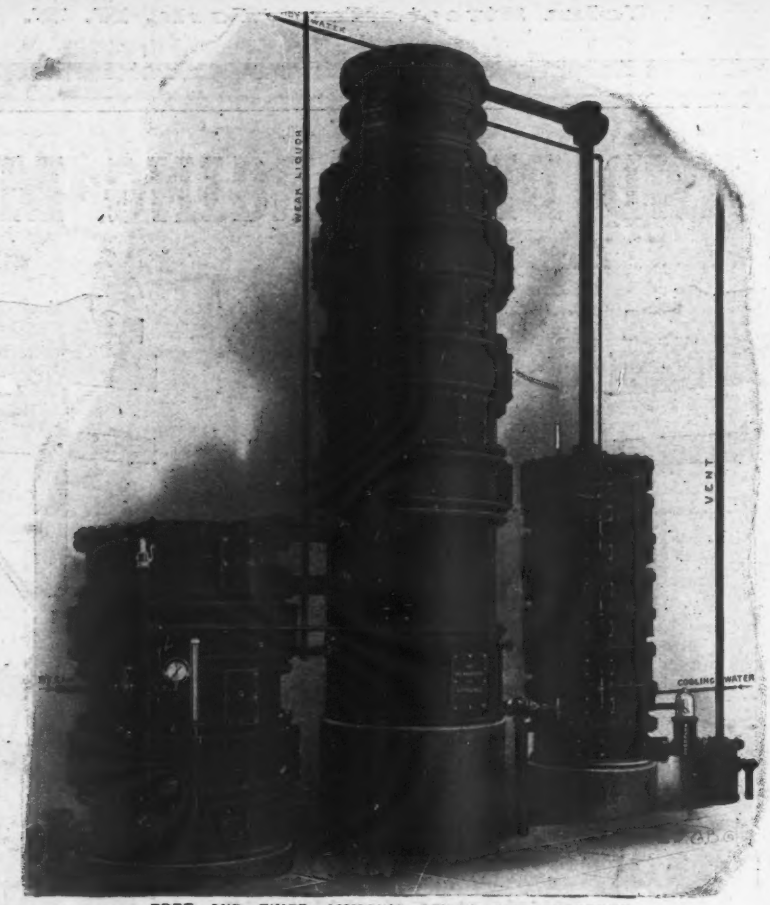

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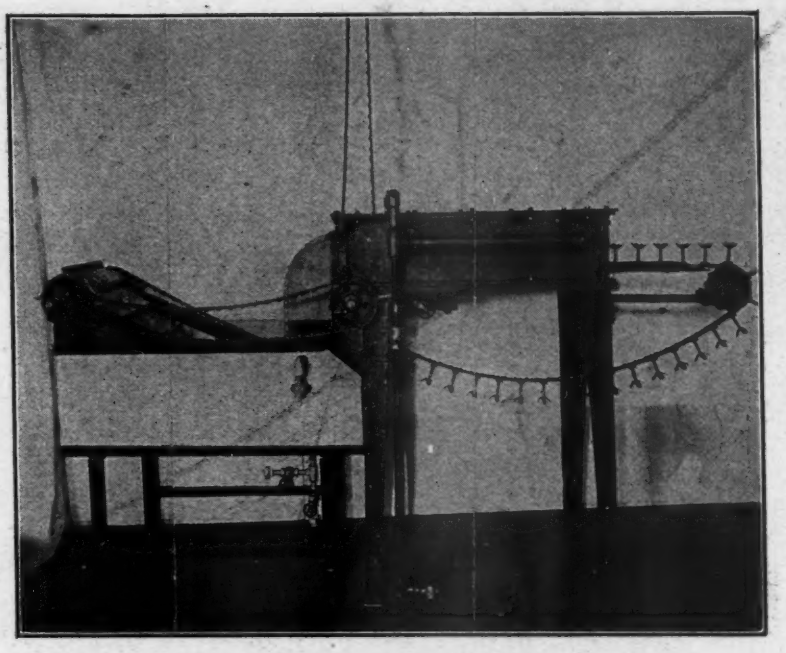

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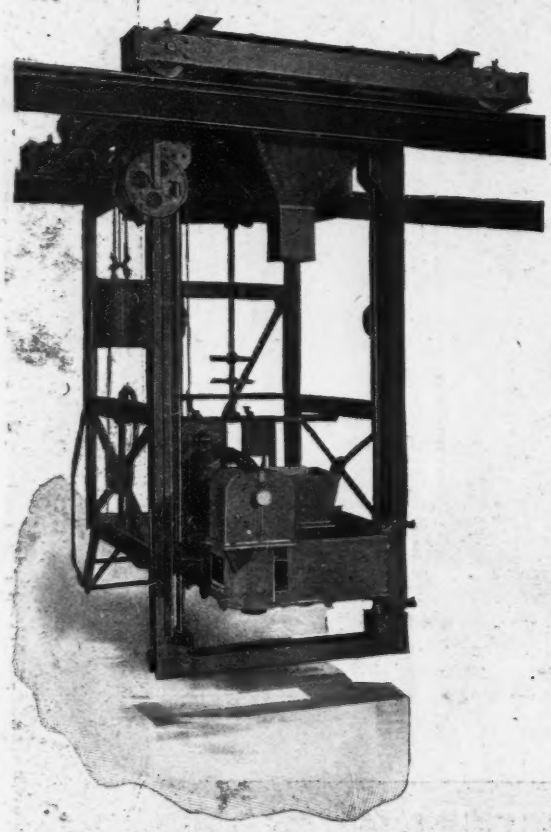

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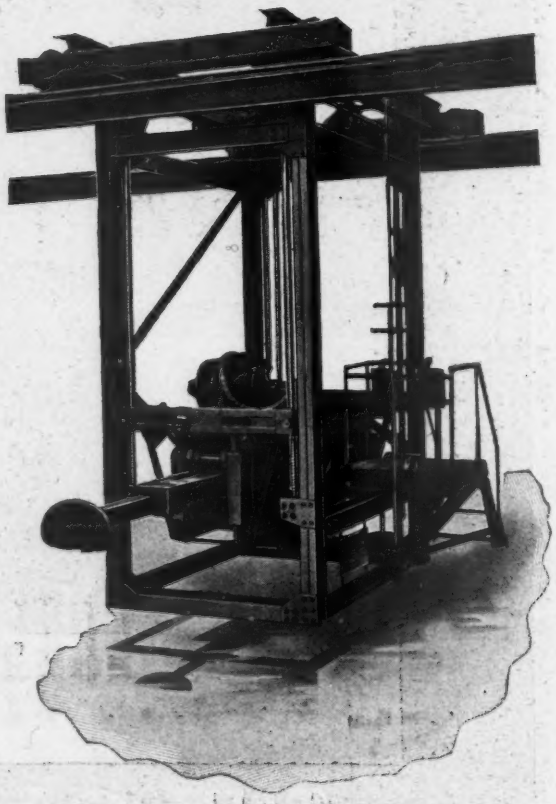

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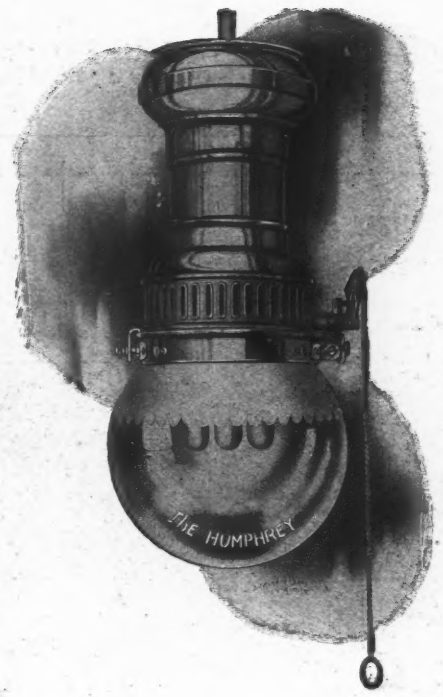

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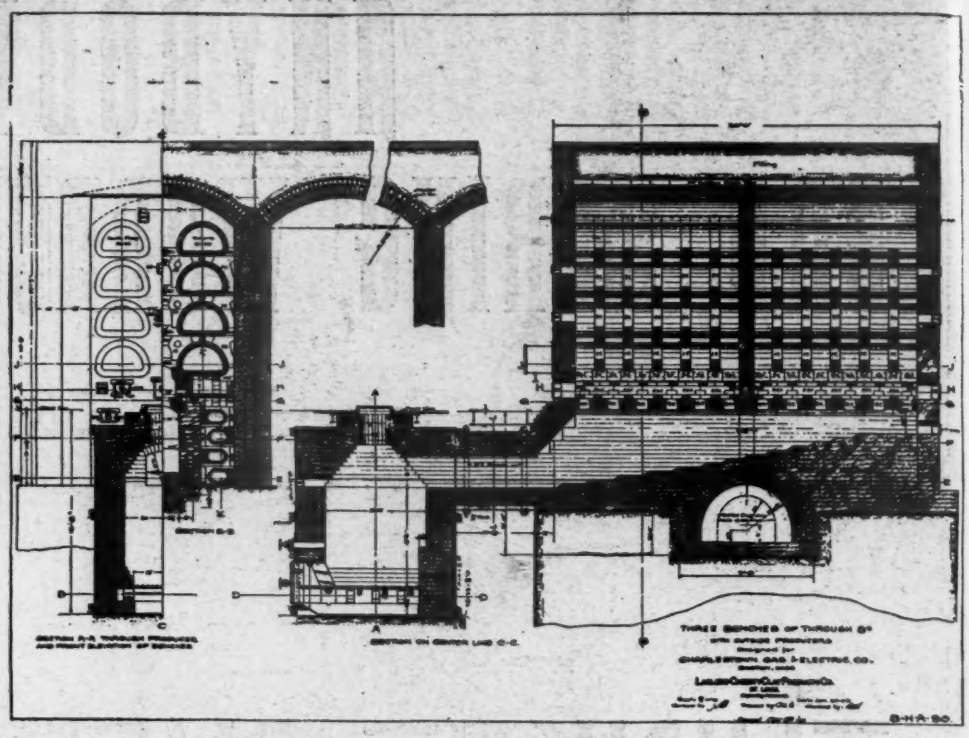

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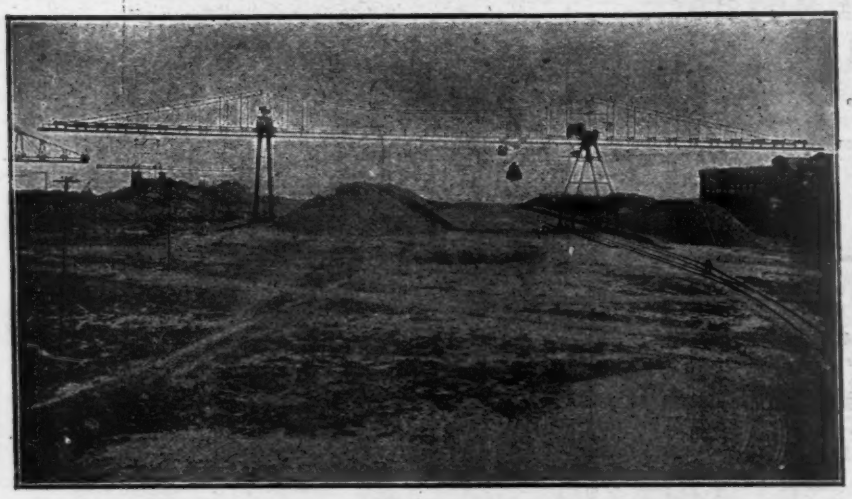

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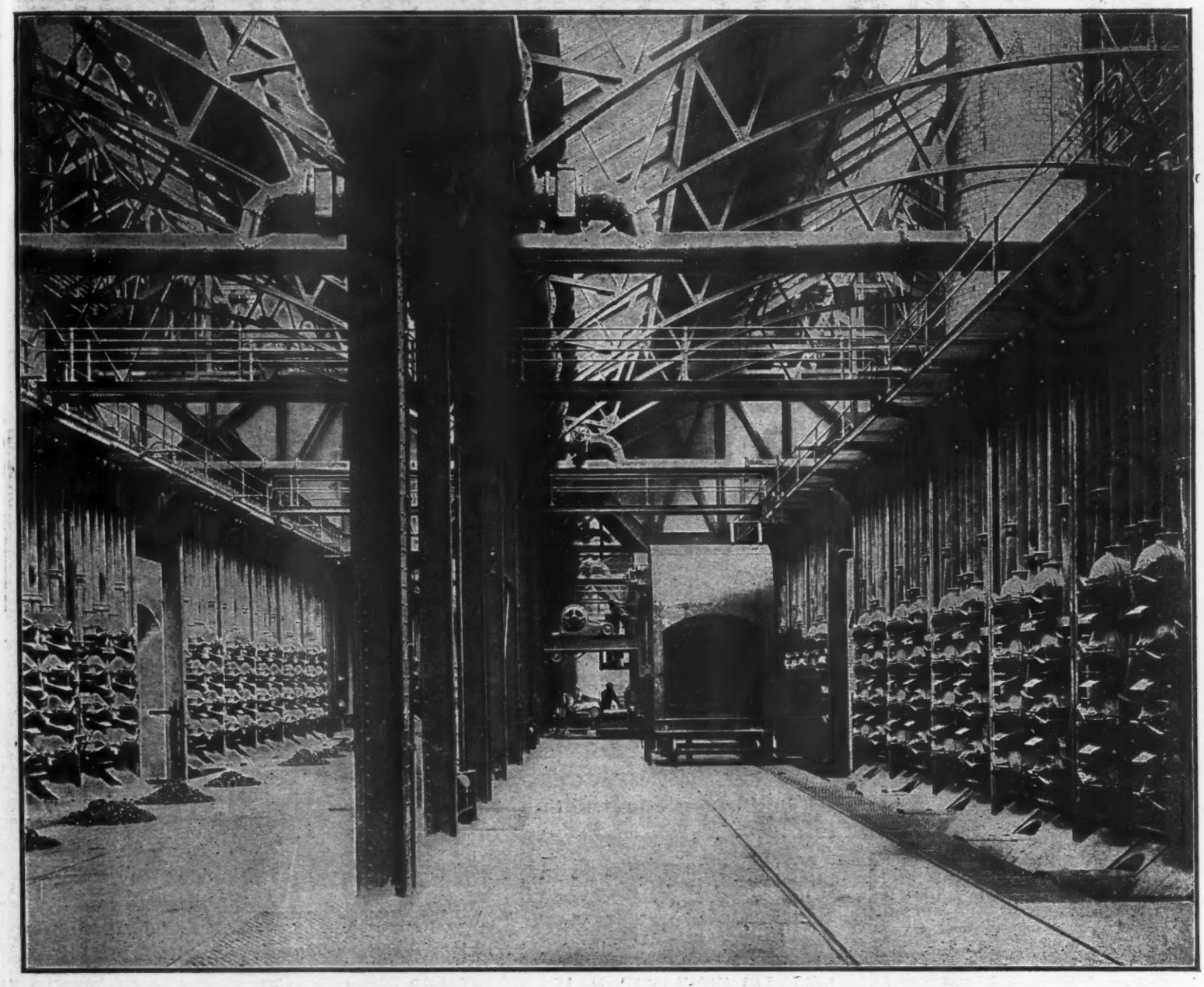

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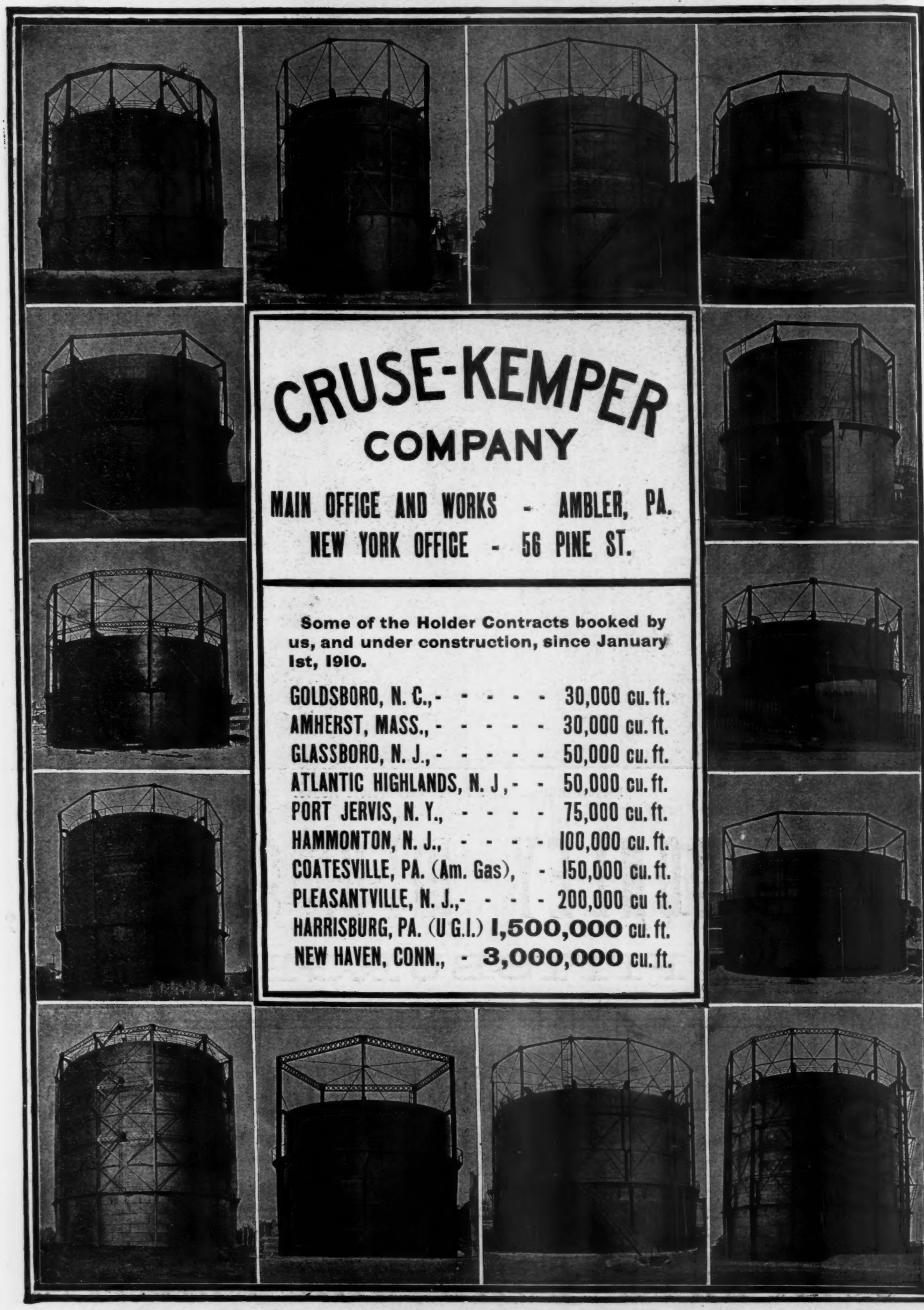

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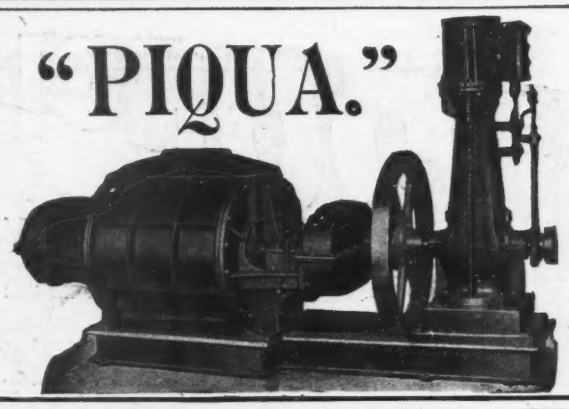

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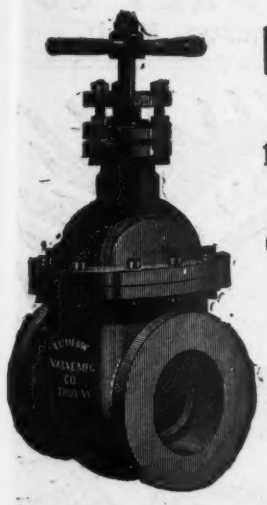

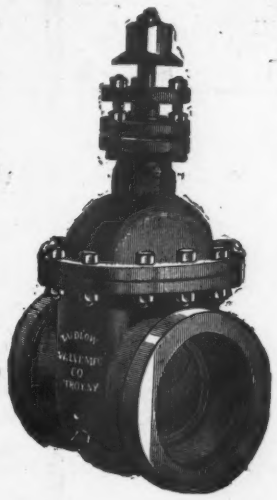

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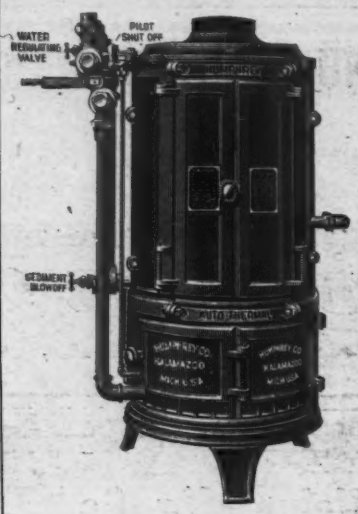

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PUBLIC LIGHTING TABLES FOR MAY, 1910.

[COMMUNICATED BY THE AMERICAN METER COMPANY.]

Day of Week.	Table No. 1. FOLLOWING THE MOON. Date.	Light.	Extinguish.	Day of Week.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Date.	Complete Lighting in 1 Hour. From Time Given.	Complete Extinguishing in 50 Minutes. From Time Given.
		P.M.				P.M.	A.M.
Sun.	1	7.30	2.30 A.M.	Sun.	1	6.47	3.52
Mon.	2	7.30 L.Q.	3.10	Mon.	2	6.47	3.52
Tue.	3	7.30	3.40	Tue.	3	6.47	3.52
Wed.	4	7.30	4.00	Wed.	4	6.47	3.52
Thu.	5	7.30	4.00	Thu.	5	6.47	3.52
Fri.	6	7.30	4.00	Fri.	6	6.47	3.52
Sat.	7	7.30	4.00	Sat.	7	6.57	3.42
Sun.	8	7.30 N.M.	3.50	Sun.	8	6.57	3.42
Mon.	9	7.30	3.50	Mon.	9	6.57	3.42
Tue.	10	7.30	3.50	Tue.	10	6.57	3.42
Wed.	11	7.30	3.50	Wed.	11	6.57	3.37
Thu.	12	7.30	3.50	Thu.	12	6.57	3.37
Fri.	13	11.20	3.50	Fri.	13	6.57	3.37
Sat.	14	12.00	3.50	Sat.	14	7.07	3.27
		A.M.					
Sun.	15	12.30 F.Q.	3.40	Sun.	15	7.07	3.27
Mon.	16	1.00	3.40	Mon.	16	7.07	3.27
Tue.	17	1.20	3.40	Tue.	17	7.07	3.27
Wed.	18	1.40	3.40	Wed.	18	7.07	3.27
Thu.	19	2.10	3.40	Thu.	19	7.07	3.27
Fri.	20	2.30	3.40	Fri.	20	7.07	3.27
Sat.	21	2.50	3.40	Sat.	21	7.12	3.22
Sun.	22	No L.	No L.	Sun.	22	7.12	3.22
Mon.	23	No L. F.M.	No L.	Mon.	23	7.12	3.22
Tue.	24	No L.	No L.	Tue.	24	7.12	3 22
Wed.	25	7.50 P.M.	10.00 P.M.	Wed.	25	7.12	3.22
Thu.	26	7.50	11.00	Thu.	26	7.12	3.22
Fri.	27	7.50	11.50	Fri.	27	7.12	3.22
Sat.	28	7.50	12.30 A.M.	Sat.	28	7.12	3.17
Sun.	29	7.50	1.10	Sun.	29	7.12	3.17
Mon.	30	7.50	1.40	Mon.	30	7.12	3.17
Tue.	31	7.50 L.Q.	2.10	Tue.	31	7.12	3.17

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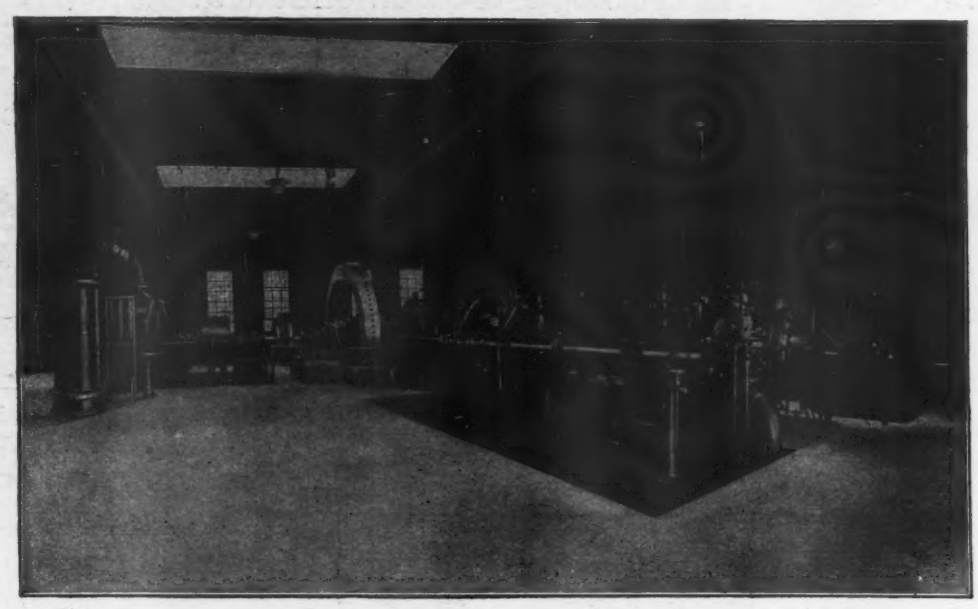
A half century of experience, up-to-date engineering and shop facilities embodied in these **World Famous Gas Exhausters.**



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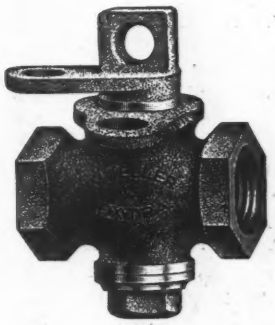

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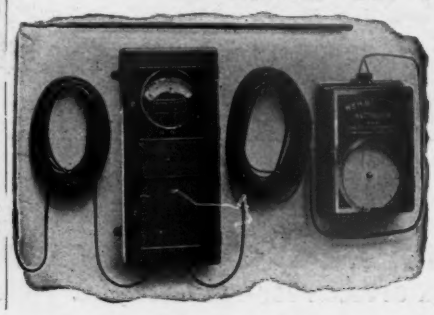

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MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October, 1910. New York City. Officers: President, Wm. H. Bradley, N. Y., City; Secretary, A. B. Beadle, 29 West 39th street N. Y. City.

Canadian Gas Association.—Annual meeting, June, 1910. Hamilton, Ont Officers President, J. S. Norris, Montreal, P. Q.; Secretary and Treasurer, A. W. Moore Woodstock, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1910. New York City. Officers: President, C. R. Huntley, Buffalo, N, Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, December. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, A. K. Quinn; Newport, R. I.; Secretary, Walter G. Africa, Manchester, N. H.

Illinois Gas Association.—Annual meeting, time, March, Chicago, Ills. Officers: President, A. S. Harrington, Chicago, Ill.; Secretary-Treasurer, C. B. Strohn, Elgin, Ill.

Illuminating Engineering Society.—Annual meeting, January —, 1911. Meetings of Sections, monthly. President, W. H. Gartley, Philadelphia, Pa.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York: Secretary, Albert J. Marshall, 227 Fulton street. New England, Secretary, L. D. Gibbs 39 Boylston street, Boston, Mass. Philadelphia, Secretary, F. N. Morton, Broad and Arch streets Chicago, Secretary, T. R. Beebe, 157 Michigan avenue,

ndiana Gas Association.—Annual meeting, January 19, 1911, Fort Wayne, Ind. Officers: President, Carl H. Graf, Indianapolis; Vice-President, S. E. Mulholland; Secretary-Treasurer, Philmer Eves, Indianapolis Gas Company, Indianapolis, Ind.

Iowa District Gas Association.—Annual meeting, time, June 23, 24, 25, 1910, Sioux City, Ia. Officers: President, Geo. H. Waring, Omaha, Neb.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association—Annual meeting, time, September, 1910; ———— Officers: President, B. O. Tippy, Grand Rapids, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April 14, 15 and 16, 1910; Jefferson City, Mo. Officers: President, W. A. Bixby; Secretary and Treasurer, C. L. Clary, Sikeston, Mo.

National Commercial Gas Association.—Annual meeting, December, 1910: Boston. Officers: President, E. N. Wrightington, Boston; Secretary, Louis Stotz, 36 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May 17, 18 and 19, 1910; Oklahoma City, Okla. Officers: President, William H. McKenzie, Kansas City, Kas.; Secretary, T. C. Jones, Delaware, O. Editor Wrinkle Department, F. W. Stone, Ashtabula, O.

New England Gas Association.—Annual meeting, third Wednesday in February; Boston. Officers: President, W. H. Snow, Holyoke, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

Oklahoma Electric Light, Railway and Gas Association.—Annual meeting, May 18, 19 and 20, 1910; Oklahoma City. Officers: President, F. H. Tidman, Oklahoma City, Okla.; Secretary-Treasurer, Galen Crow, Guthrie, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1910, Los Angeles, Cal. Officers: President, W. B. Cline, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 925 Franklin street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1911, Reading, Pa. Officers: President, J. H. Keppelman, Reading, Pa.; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1910; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 1123 Broadway, New York.

Southern Gas Association.—Annual meeting, Feb. 16, 1911, Montgomery, Ala. Officers: President, H. W. Frund, Salisbury, N. C.; Secretary-Treasurer, Jas. Ferrier, Rome, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. ————, 1910, Beaumont, Tex. Officers: President, R. B. Stichter, Dallas, Tex.; Secretary's office, 300 Commerce street, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 11 and 12, 1910, Milwaukee, Wis. Officers: President, R. B. Brown, Milwaukee, Wis.; Secretary-Treasurer, H. H. Hyde, Racine, Wis.

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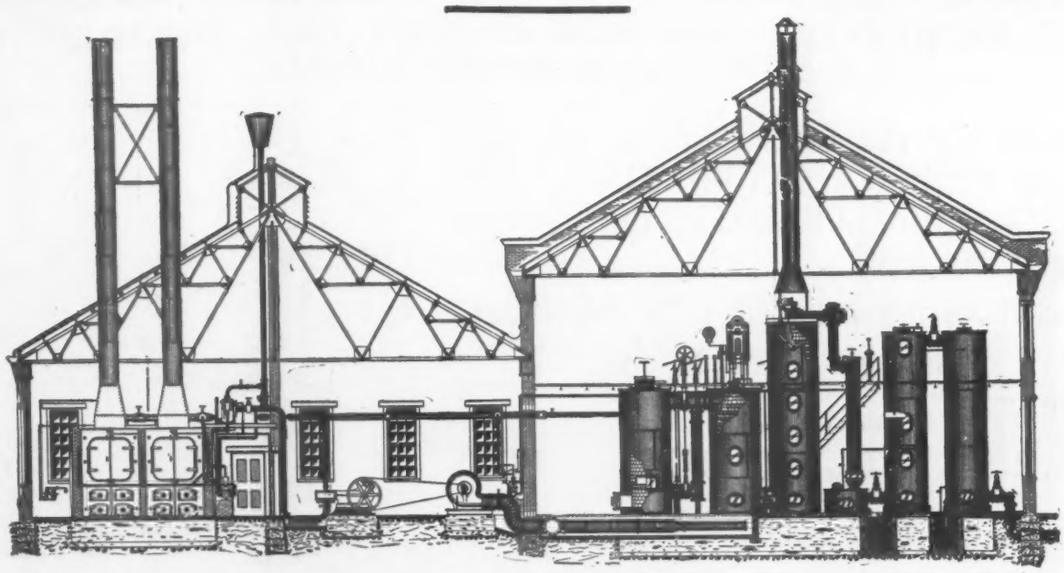

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Middletown, Conn.	Burlington, Ia.	Sag Harbor, N. Y.	Moline, Ills.
Weatherford, Tex.	Des Moines, Ia.	Wilmington, Del.	Aurora, Ills.
New Bedford, Mass.	Pelham, N. Y.	Hammond, Ind.	Goldsboro, N. C.
Dallas, Tex.	Pleasantville, N. J.	Sumter, S. C.	Hoopeston, Ills.

TOTAL NUMBER OF SETS INSTALLED DURING YEAR 1909, ... 31
TOTAL NUMBER OF SETS INSTALLED TO JANUARY 1, 1910, ... 721
TOTAL DAILY CAPACITY TO JANUARY 1, 1910, ... 585,590,000 cu. ft.

Tar Extractors for Carburetted Water Gas
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts.
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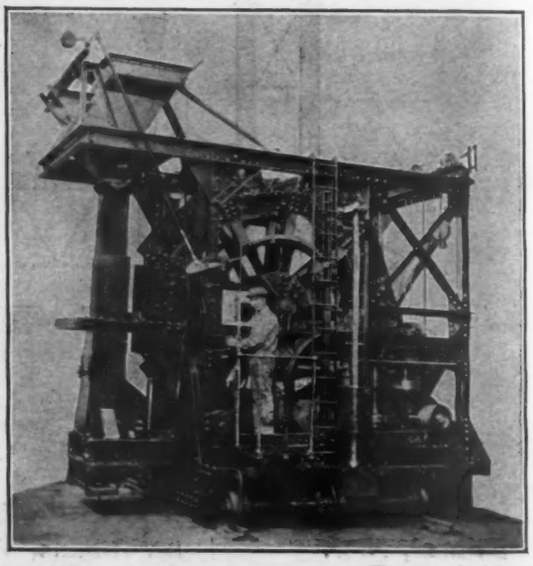

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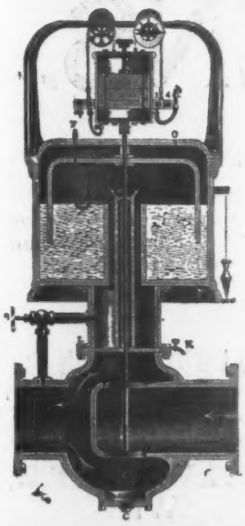

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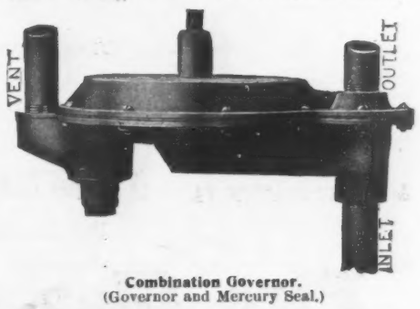

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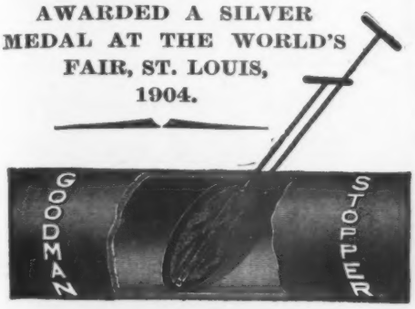

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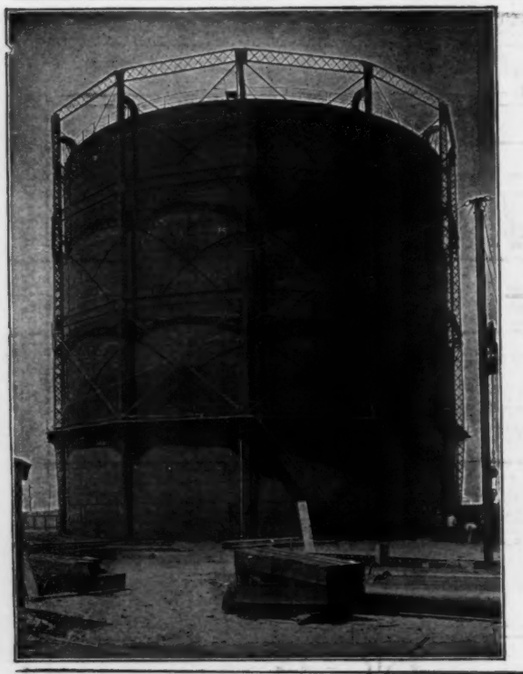

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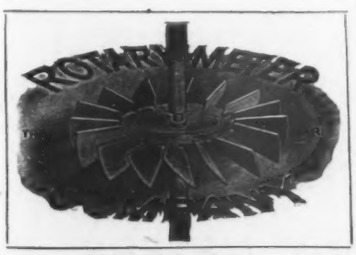

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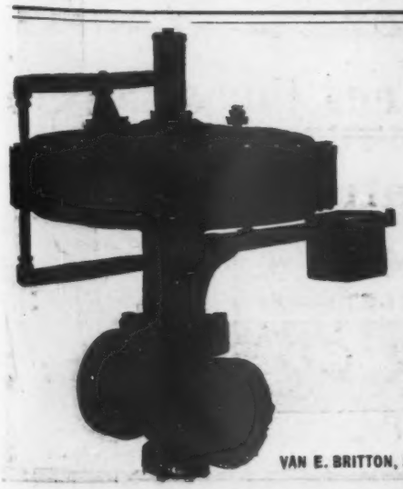

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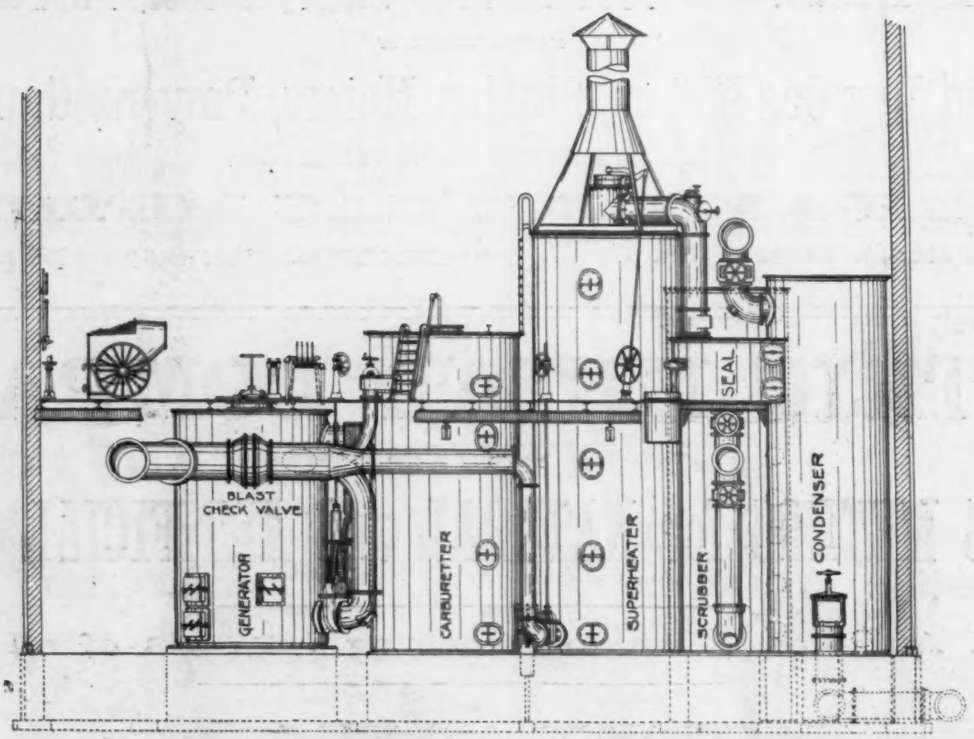

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